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# WILDLIFE REVIEW

An abstracting service for wildlife management
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Except as indicated, abstracts are by William H. Stickel, editor.

NATURAL RESOURCES & CLIMATE

Chilson, Hatfield. (Dept. Interior, Wash.) NATURAL RESOURCES IN THE FUTURE OF DEMOCRACY. Trans. 22nd N. Am. Wildl. Conf. p. 38-43. 1957.

By 1975 our 221 million population will be using 453 billion gal. of water daily, twice the present amount, and 321 billion kilowatts of electricity, nearly 3 times that presently used. By 1966 more than 80 million persons will visit our national parks annually. The number of hunters and fishermen, now 25 million, will increase greatly in the next decade, and natural habitat is shrinking. Only 1/4 of the water that falls in the W. and 1/12 of that which falls in the E. is utilized. The Dept. Int. has invested nearly $3 billion dollars in w. water projects and the Corps of Engineers has invested more than $3 billion throughout the country. Department-sponsored research to convert sea water to fresh water is progressing; a method of saving water by cutting evaporation with a film of hexadecanol spread over the water is being studied for its effect on fish and wildlife. Ten year plans are meeting National Park and Fish and Wildlife Service problems. Twenty % of our power is water-generated now; in the future only 8.5% will be so generated, 14.5% will come from atomic sources, and77% will be steam-generated using fossil fuels. The cost of increasing our power output will be $95 billion in the next 12 years. Coordination of federal, state and private efforts is necessary if we are to use, conserve and develop our natural resources.--Author.

Clawson, Marion, and Burnell Held. THE FEDERAL LANDS: THEIR USE AND MANAGEMENT. Publ. for Resources for the Future by Johns Hopkins U. Press. 501 p., 29 figs., 13 photos. 1957. $8.50. [From reviews by D. E. Wade, J. Soil & Water Cons. 13(1); and B. W. Allred, Soil Cons. 23(6).]

An important, authoritative book that is certain to stimulate thought and controversy. The authors point out that federal lands are already of great economic importance and that many uses that are urged for them conflict with one another. Recreational and educational values are great, though difficult to appraise. Problems of multiple use will become more acute. Type of management is considered the real problem rather than disposal or enlargement of federal holdings. More intensive management and greater revenues are predicted. Federal land law is tangled and past management has been guided primarily by economic considerations. Improvements in management are needed. The authors suggest a federal land corporation to manage all federal lands, but discuss other approaches to future management. One appendix is on laws and regulations; another is on statistical facts about the lands.

Geiger, Rudolph. THE CLIMATE NEAR THE GROUND. Revision and translation of 2d German ed. Harvard U. Press. 494 p., illus. 1957. $6.00. [From long review by O. P. Cramer, J. For. 55(11).]

New edition of the main work on microclimates. Minor corrections have been made and an extensive up-to-date bibliography for each chapter has been added.

O'Donnell, D. John. (Wis. Cons. Dept., Madison.) WATER, WATERSHEDS...AND YOU. Trans. 22nd N. Am. Wildl. Conf. p. 196-213. 1957.

Considers the values of the water and land resources and the importance of using the organized community watershed as the management unit. The Wis. program is reviewed and methods of operation are explained. The Four-Agency Agreement and the Commission policy on Watershed Management are discussed. An appeal is made for a single authoritative management agency combining all federal interests in water. A similar agency should be established in each state. All management would be on a watershed basis.--Author.

Sand, George X. (Deerfield Beach, Fla.) REVISED FEDERAL LAND POLICY DENIES DEVELOPMENT. Trans. 22nd N. Am. Wildl. Conf. p. 96-108. 1957.

"...by means of reconveyance bills that can be and several of which already have been presented to Congress this Joint Policy encourages the selling back of...tremendously improved and very valuable federal reservoir lands to a 'favored few' original owners, and this at a very small fraction of their present worth." This action was prevented in connection with the Jim Woodruff Wildlife Management Area in Fla. only by a special act of Congress. The author strongly urges revocation of the Joint Policy and also review of the entire 1946 coordination act governing the consideration of fish and wildlife values in river basin programs.

Swift, Ernest. (Natl. Wildl. Fed.) BY WHICH WE LIVE. Natl. Wildl. Fed., 232 Carroll St. N.W., Wash. 12, D. C. iii + 38 p. 1957. Price not stated.

Scholarly and forceful essays on the philosophies, history, and problems of conservation. What is conservation? Who are the destroyers? Who is responsible? What are the rationalizations? These and many other questions are asked concerning resource use in the United States. The answers reflect little credit on anyone. Education and cooperation are urged as avenues for improvement and hope in the conservation picture. Rural zoning, implemented by Wis. landowners, is cited as a sound and important conservation technique.--L. F. Stickel.

## SOILS

Bacon, S. R., and others. SOIL SURVEY OF McMINN COUNTY, TENNESSEE. US Soil Cons. Serv., Ser. 1948, no. 4. 1-109 p., 9 figs. + large, colored, single-fold maps. Oct. 1957. Price not stated. Sold by Supt. Documents.

This and the soil survey of Pasquotank Co., N. C., are in a new, large format of 9 x 11 inches. Maps are bound into the volume and each has but one fold, which makes them enormously easier to use in the field, makes them more durable and harder to lose, and eliminates the annoying problems of multiple cross-folds. These volumes and their detailed maps should be useful for many purposes, but users should realize that the surveys on which they were based were made nearly a decade ago, as indicated by series designations.

Shearin, A. E., and others. SOIL SURVEY OF PASQUOTANK COUNTY, NORTH CAROLINA. US Soil Cons. Serv., Ser. 1949, no. 3. 1-58 p., 10 figs. + large single-fold maps based on aerial photos. Oct. 1957. Price not stated. Sold by Supt. Documents.

## CONSERVATION EDUCATION

Benton, Allen H., and Wm. E. Werner, Jr. (N. Y. Coll. Teach., Albany.) WORKBOOK FOR FIELD BIOLOGY AND ECOLOGY. Burgess Publ. Co., 426 S. 6th St., Minneapolis 15, Minn. x + 268 p., 8 figs. 1957. $2.75, paper, spiral binding.

"This workbook is designed to give the beginner in field biology a background in several areas, and to suggest sources for further information." This it certainly does. It should be very useful as a laboratory and field guide for teaching natural history on the undergraduate or amateur level. The authors have kept their material simplified throughout, so the book is not suitable for use as a guide to research methods. On the other hand, many good references and bibliographic aids are listed and exercises in using them are urged. Geographically, the book is geared to the ne. U. S., although 1 desert exercise and a few w. references are included. It could, of course, be used anywhere with minor adaptations. The book includes references, questions, and blank form sheets for the various exercises that are proposed. Section I introduces the fundamentals of classification and identification of plants and animals: meaning of scientific names, use of keys, etc. Section II is on methods: taking notes, collecting and preserving specimens, reading animal signs, studying stomach contents, making certain limnological tests, using quadrats and transects, studying plant and animal populations. Section III discusses various communities and outlines exercises for studying them: shrub stage, grassland climax, rotten log, etc. Section IV takes up aquatic communities in similar fashion. Section V suggests elementary studies of populations of mammals, birds, and reptiles. Section VI outlines some ways of studying behavior of squirrels, birds, breeding amphibians, and nocturnal animals. Section VII suggests little studies individuals might conduct in connection with class work. Section VIII is devoted to lists of references on various groups and subjects, and sources of information or assistance.

Brumsted, Harlan B. (Cornell U., Ithaca, N. Y.) A WORKSHOP FOR SPORTSMEN. Trans. 22nd N. Am. Wildl. Conf. p. 607-618, 2 photos. 1957.

For 6 years, 1951-1956, the Dept. of Cons. at Cornell U. has conducted a workshop for sportsmen. The activity is sponsored by the N. Y. State Cons. Council, a statewide sportsmen's organization. Workshops are 3-day meetings in

out-of-door camps in various places about the state where problems or demonstrations are available nearby. 146 sportsmen-leaders from 38 of the state's 62 counties have participated; over 1/3 have attended 2 or more years. The Workshop has become firmly established as an apparently effective means for instructing sportsmen in basic conservation principles and presenting objective reviews of current resource problems.--Author.

Davis, Cecil N., and Ray M. Wells. (Box 342, Bethany, Mo.) A RURAL YOUTH PROGRAM AND CONSERVATION AT WORK. Trans. 22nd N. Am. Wildl. Conf. p. 632-642. 1957.

A method of teaching farm youth overall conservation and the utilization of ponds and waste lands for fish and wildlife. Details of the organization and development of a cooperative program between the Mo. Cons. Comm., Mo. State Dept. Educ., and Sears Roebuck Agr. Found. F.F.A. boys were taught fundamentals of wildlife and soil conservation, planting and management techniques, in school and on the land. Results: 6,000 farm youths trained, 100 functioning demonstrations developed, 80 to 100% change of attitudes of F.F.A. members contacted. Sample forms for memo of understanding between agencies and contract between landowner and F.F.A. are included.--C. N. Davis.

Division of Information. SELECTED LIST OF FISH AND WILDLIFE MATERIALS FOR CONSERVATION EDUCATION. US F&WS, Wildl. Leafl. 391. 2 p. Aug. 1957.

Lists 38 publications of the F&WS that are of value in conservation education and are available from Superintendent of Documents. Papers listed are from the following series: Circulars, Conservation Bulletins, Conservation in Action, and Refuge Leaflets. The papers pertain to such topics as wetlands of U. S., national survey of hunting and fishing, attracting birds, fishery resources, fish hatcheries, control of rodents and predators, and specific refuges. Price of each paper is stated.

Dodge, John E. (N. H. Game Dept., Concord.) NEW ENGLAND'S TEAMWORK APPROACH TO OUTDOOR EDUCATION. Trans. 22nd N. Am. Wildl. Conf. p. 619-625. 1957.

Inter-agency collaboration between conservationists and educators under the stimulus of the national Outdoor Education Project has set up regional machinery of a continuing nature to support conservation education efforts and outdoor teaching programs under existing leadership in the member states. The current national trends toward outdoor recreation, and pyramiding pressures on natural resources, render such a program crucial to make public school education realistic.--Author.

Hockstrasser, Herb. (Fort Morgan Jr. High School, Colo.) THE MORGAN JUNIOR CONSERVATION CLUB. Trans. 22nd N. Am. Wildl. Conf. p. 594-606, 5 figs. 1957.

Fort Morgan, Colo. has a uniquely successful conservation club. It is sponsored by the school, but has active community participation. Special projects, including several in erosion control, are included in the program, as are field trips to areas of special conservation interest. The club attracts a large and enthusiastic membership from the junior high school students, probably both because of its policy of action and participation and because of its effective adult leadership.

Rockcastle, Verne N., and Eva L. Gordon. SCIENCE BOOKS FOR CHILDREN. Cornell Rural Sch. Leafl. 51(1): 1-64. Fall [1957].

Useful to educators or parents. Includes wide selection of books published 1950-57. Arrangement is by subject: nature study, animal life, mammals, birds, reptiles, amphibians, fish, invertebrates, plants, earth science, physical and chemical forces. Both fiction and nonfiction books are treated. Each book is described and roughly evaluated and the age level for which it is most suitable is indicated. It is surprising to find how many good books of these sorts there are today. Many of them are animal biographies with a conservation slant. This pamphlet unfortunately does not state prices; most children's books are lamentably costly.

CONSERVATION EDUCATION--Continued

Sylvester, Walter R. (Wis. State Coll., Stevens Point.) THE NEED FOR GENERALISTS IN CONSERVATION. Trans. 22nd N. Am. Wildl. Conf. p. 627-631. 1957.

Many people have recognized the need for broader basic training of professional conservationists, usually following training in a specialized field, but I believe that our future resource managers should be educated as general conservationists first. Integrated resource-use programs need general conservationists, and general conservation should be recognized as a separate profession. General conservationists receive training in communications, basic sciences, social sciences, and each resource field. This is sound preparation for many public relation, integrated resource use, beginning land management, soil bank, and protection positions. This broad preparation is better than that of the specialist, because these jobs involve work with all resources and with people; this should be recognized in civil service requirements and examinations. General conservation must be recognized as the basic conservation profession because a thorough understanding of all resources and their interrelationships is a prerequisite to the intelligent management of any single resource.--Author.

Taylor, M. N. (Merrill, Wis.) TREES FOR TOMORROW--AN INDUSTRIAL APPROACH TO RESOURCE MANAGEMENT. Trans. 22nd N. Am. Wildl. Conf. p. 652-658. 1957.

When interest is stimulated in any phase of resource management, opportunity for action should follow. The framework of the Trees for Tomorrow program is predicated upon this idea. Distributing free trees is followed by stimulating the buying of trees from the state. Opportunity for large scale reforestation is presented through the use of 4 planting machines. Technical assistance of three foresters is available for forest management. To gain first hand knowledge of Wis. resources, their wise use and renewal, citizens are invited, within groups of their own choosing, to the Trees for Tomorrow Camp. Personal contact, self-help, carry-over effect, and action programs are paramount in tapping the vast potential of the Am. public, 85% of whom have direct contact with our natural resources.--Author.

Weaver, Richard L. (U. Mich., Ann Arbor.) STATE CONSERVATION EDUCATION PROGRAMS. Trans. 22nd N. Am. Wildl. Conf. p. 644-651. 1957.

Preliminary results of a research survey. Facilities and organization for public school education and teacher training are reviewed and summarized.

BIBLIOGRAPHIES, DIRECTORIES, BIOGRAPHY, HISTORY

Coyle, David Cushman. CONSERVATION / AN AMERICAN STORY OF CONFLICT AND ACCOMPLISHMENT. Rutgers U. Press, New Brunswick, N. J. xii + 284 p., 12 pl. 1957. $5.00.

The story and background of conservation in the U. S. Some conservation practices were used before history began. Washington and Jefferson applied soil-building measures. George P. Marsh wrote clearly of the whole conservation picture in 1864, but was unheeded because our nation was still exploiting new resources. Only with Gifford Pinchot and Theodore Roosevelt in 1907 did conservation assume the name and the form in which we know it. It is with the great period of progress under Pinchot's influence that this book deals most strongly. Then the idea of forest management was spread, national forests were created, and fights were waged to preserve and manage the public domain. The whole idea of multiple use and unified resource planning was conceived and disseminated. Set-backs and bad planning still occur and new issues arise perpetually, but the situation is infinitely better than might have been expected in 1900, when destructive exploitation was the rule. Coyle devotes much space to the basic struggles for forests and lands in the early part of this century, but he also tells of the origins of and fights for hydropower development, rural electrification, soil conservation, water management, and river basin development. He traces their histories concisely, with names and dates--and he supplies enough background and opinion to give perspective. He does not conceal the fact that he favors strong governmental action in conservation and is skeptical of big business. His discussion of minerals and fuels is mostly on needs and policies. The section on wildlife is chiefly on diminution of recreational lands and on some recent controversies. The chapter on the world

significance of conservation is relatively optimistic, but, like the rest of the book, is basically realistic. The real weaknesses of the book are that it covers too much too quickly, and is not always easy reading. On the other hand, some parts about the Pinchot period read like a novel, and stimulating thoughts appear throughout. The book is so up-to-date that it includes 1957 material. It lists no references, unfortunately, but has a good index.

Nixon, Edgar, editor. FRANKLIN D. ROOSEVELT & CONSERVATION 1911-1945. Franklin D. Roosevelt Library, Hyde Park, N. Y. 2 vols. xiv + 614 + 700 p., 2 photos. 1957. $9.50. [From review by Howard Zahniser, Nat. Mag. 51(3).]

## PLANTS--GENERAL, ECOLOGY, TECHNIQUES

Coon, Nelson. USING WAYSIDE PLANTS / ONE HUNDRED USEFUL PLANTS OF THE NORTHEASTERN UNITED STATES AND HOW TO USE THEM. 2d edition. Eaton Press, Watertown, Mass. 254 p., 170 drawings, 90 maps. Revised 1958. $3.00.

An interesting book on past and present uses of common plants of the NE. The author hopes to awaken us to the pleasures and values that can be found along almost any country road, and to keep us from feeling that all good things come from the store. His book is reasonable in price and should go a long way toward serving the desired purpose. It has an index and a list of selected references. One chapter gives many unusual recipes for cooking wild plants or making beverages from them. Other chapters tell how to use plants for various craftwork, for amusement of children, for making dyes, for decoration indoors and out, and for medicines. These chapters offer many suggestions that would be worth following, if only for the fun of seeing how the old-timers did things. The author is fairly cautious about recommending herbal medicines, but may still be a bit too enthusiastic to please doctors. The second and greater part of the book takes up plants species by species, with pen and ink drawings and maps, and tells of the uses of each kind. Poisonous plants are the subject of the final chapter.

## PLANTS--FLORAS, COMMUNITIES, TAXONOMY

Bliss, L. C., and J. E. Cantlon. (U. of Ill., Urbana.) SUCCESSION ON RIVER ALLUVIUM IN NORTHERN ALASKA. Am. Midl. Nat. 58(2): 452-469, 6 figs. Oct. 1957.

Succession along Colville River at Umiat is: 1. Pioneer stage, perennial herbs. 2. Vigorous willow stage dominated by feltleaf willow. 3. Feltleaf willow deteriorating and lower cover of greenleaf willow, mosses, and herbs increasing. 4. Alder-willow-heath type. These are described and factors affecting them are discussed.

Grimm, Wm. Carey. THE BOOK OF SHRUBS. Stackpole, Harrisburg, Pa. xvii + 522 p., illus. 1957. $5.00.

Unrevised reprint of "The Shrubs of Pennsylvania," 1952. No indication of original date or title is given. The publishers have added a note saying that since Pa. is representative of the NE, and has "virtually all of the shrubs which occur from Virginia northward into Canada and westward to the Mississippi Valley, this book can be utilized as a guide to the shrubs of this vast region." The original edition was very favorably reviewed in WR 68: 39. We there stated: "There are good, workable keys to the shrubs in both summer and winter conditions, illustrations of characters, a glossary, large clear drawings of each species, non-technical descriptions, habitat statements, and notes on use by man and wildlife. Both general range and Pennsylvania distribution are given in adequate detail."

Grimm, Wm. Carey. THE BOOK OF TREES. Stackpole, Harrisburg, Pa. xiii + 363 p., illus. 1957. $5.00.

Unrevised reprint of "The Trees of Pennsylvania," 1950. No indication of original date or title is given. As in "The Book of Shrubs," which has been similarly treated, the publishers have added a note suggesting that the book should be useful in all states n. of Va. and e. of Miss. River. The volume is well designed for general use, and is no more technical than necessary. Large

drawings accompany species accounts that stress summer and winter characteristics, natural history, and general distribution. There are both summer and winter keys. A number of introduced trees are treated. Glossary and illustrations of features used in descriptions are helpful. Another feature is lists of trees and shrubs of the various forest associations of Pa. A systematic list, selected references, and index complete the volume.

Harlow, Wm. H. TREES OF THE EASTERN AND CENTRAL UNITED STATES AND CANADA. Dover Publications, Inc., 920 Broadway, N. Y. 10, N. Y. xiii + 288 p., 152 figs. Reprinted 1957. $1.35, paper.

Reprint of Harlow's semipopular manual of 1942. Publisher claims that this edition is extensively revised, but in comparing quite a few pages we noted only 1 change: 2 additions to the list of references. The area covered is the Northeast. Southeastern trees, even loblolly pine, are omitted as they were in the original edition. Trees of Lake States are treated, but some (as Quercus ellipsoidalis) not fully. The book is well printed on good paper and photographs are as good as in the first edition. As an identification manual, the book is on the simplified side, suitable for use with typical specimens, but not analytical or detailed enough to help with troublesome separations. It has keys and explanations of the few technicalities that are used, and it is copiously illustrated with photographs. A typical species account has headings for Appearance, Leaves, Flowers, Fruit, Twigs, Bark, Habitat, Distribution, and Remarks. "Remarks" includes notes on commercial, woodcraft, and wildlife uses. Considering its simplicity, readability, low price, and compact size (6-1/2 x 4-1/2 x 1/2), this handbook can be recommended for general, but not precise, use in the ne. states.

Mason, Herbert L. (U. Calif., Berkeley.) A FLORA OF THE MARSHES OF CALIFORNIA. U. Calif. Press. ix + 878 p., 367 figs. 1957. $10.00.

An excellent, important manual that will be of great value in much of the West. It will also be of reference value elsewhere in U. S., for many wetland plants are of wide distribution and the book presents results of critical studies. The volume is of particular interest to wildlife biologists because it was financed by PR funds and is intended as a tool in waterfowl management. It is based on 4 years of special field work. It includes all aquatic and wetland plants of Calif., including many species that are only marginally wetland plants. Aside from a brief introduction on habitats, floristics, and the like, the whole book is a taxonomic manual. Keys to all groups are provided. Families and genera are diagnosed. Species are described, their habitats and ranges in Calif. are outlined, and their broader ranges are mentioned. Taxonomic notes and references are included where necessary. Common names are given for a large proportion of species. The book is technical, designed for serious work. It has, however, a fine illustrated glossary and other illustrations of terms used. Even better, it has hundreds of pages of splendid drawings of plants and details of their structures. Some species are not illustrated, but, on the whole, few floras are as well illustrated, qualitatively or quantitatively. A minor criticism is that the longer keys would be easier to use if the couplets were numbered. Commendably, keys are dichotomous rather than multiple-choice. An index completes this worthwhile and reasonably priced volume.

Phillips Petroleum Co. PASTURE AND RANGE PLANTS. Sec. 1, Native grasses legumes and forbs, 26 p., 1955. Sec. 2, Native grasses legumes and forbs, 38 p., 1956. Sec. 3, Undesirable grasses and forbs, 46 p., 1956. Sec. 4, Poisonous grassland plants, 26 p., 1957. Each completely illus. in color. Available on request from Sales Dept., Phillips Petroleum Co., 80 Broadway, N. Y. 5, N. Y.

A remarkable and beautifully illustrated series of pamphlets prepared with the aid of specialists and artists. The aim is to encourage intelligent use of grasslands. Advertising is held to a minimum and is not run into the text. To avoid monotony, facing pages are devoted to unlike species, colorful forbs alternating with grasses. Each species is shown by a large picture in full color, often with inset of an enlarged detail. Rest of the page for a species discusses characteristics, importance, and management. Text material is substantial and serious yet nontechnical. Value of proper management, including conservative grazing, is mentioned throughout. The significance of a plant as

an indicator of range condition is pointed out where appropriate. Control methods, mentioned for undesirable and poisonous plants, stress good grassland management as one important form of control. Important species have been selected for treatment, and references are cited, so the fact that many range and pasture plants have not been included is not too important. The series as it stands is excellent for extension use or as a supplement to our colorless technical works. Further sections are planned.

Rouleau, Ernest. (U. Montreal, Canada.) STUDIES ON THE VASCULAR FLORA OF THE PROVINCE OF NEWFOUNDLAND, CANADA. I. THE GENUS DRYAS (ROSACEAE) IN NEWFOUNDLAND. II. SOME NEWFOUNDLAND VERNACULAR PLANT NAMES. III. A CHECK-LIST OF THE VASCULAR PLANTS OF THE PROVINCE OF NEWFOUNDLAND (INCLUDING THE FRENCH ISLANDS OF ST. PIERRE AND MIQUELON). Contr. Inst. Bot. Univ. Montreal 69: 1-103, illus., map. 1956. [From abstract in Biol. Abs. 31(12).]

Taylor, Wm. Randolph. MARINE ALGAE OF THE NORTHEASTERN COAST OF NORTH AMERICA. 2d edition. U. Mich. Press, Ann Arbor. 509 p., illus. 1957. $12.50. [From review by Harold C. Bold, A.I.B.S. Bul. 7(5).]

Revised edition of authoritative handbook. Includes keys to all groups and illustrations of most species.

PLANTS--FOREST SURVEYS

Bryan, Mackay B. FOREST STATISTICS FOR THE PIEDMONT OF VIRGINIA, 1957. US For. Serv., SE. For. Exp. Sta. (Asheville, N. C.), For. Surv. Rel. no. 51. II + 52 p., map & 4 graphs. Nov. 1957.

Chiefly tabular data on areas, timber volumes, stocking, growth, cut, and changes in volumes. About 8% more land is in forest, owing to reversion of agricultural land, than in 1940. Urban and highway areas increased 58% in same period. Three-fourths of commercial forest is on private farms. The upland hardwood type has increased 17%. Volume of sound growing stock is up 12%, with hardwoods up 27% and pine down 11%. Pine sawtimber is down 25%.

Division of Forest Economics Research. FOREST RESOURCES AND FOREST INDUSTRIES OF LANE COUNTY, OREGON. US For. Serv., Pac. NW. For. & Range Exp. Sta., For. Surv. Rep. 131. vii + 117 p., illus. Dec. 1957.

This county runs from coast to Cascades. Although it includes part of the famous Willamette Valley, 87% of the county is forested and 94% of the forest is commercial, mostly national forests. 71% of the commercial forest is in sawtimber, of which 2/5 is old growth, chiefly Douglas-fir. Forest industries and recreation are, of course, important. Allowable cut probably can be increased. Greater use can be made of wood residues and minor species. This paper gives an unusually thorough, readable account of the situation and has useful statistical appendix.

Twerdal, M. P., and C. D. MacLean. FOREST STATISTICS FOR TILLAMOOK COUNTY, OREGON. US For. Serv., Pac. NW. For. & Range Exp. Sta. (Portland, Ore.), For. Surv. Rep. no. 130. v + 34 p., map & graphs. Dec. 1957.

This county, famous for its great burns, has 93% of its area in forest land of some sort. This report gives much information on timber volume, forest areas, and ownership.

WILDLIFE--NEW GAME SERIES

BRANCH OF WILDLIFE REFUGES, WILDLIFE MANAGEMENT SERIES, LEAFLET. Published by Branch of Wildlife Refuges, U. S. Fish & Wildlife Service. Numbers appear irregularly and vary in length. They are processed, 8 x 10.5 inches. Single copies are available to serious workers on request to: Branch of Wildlife Refuges, U. S. Fish & Wildlife Service, Washington 25, D. C.

This series has existed for several years as a set of working guides for federal refuge personnel. Distribution has been very restricted and the leaflets have not been considered publications. Policy was changed in Jan. 1958. The leaflets are to be listed as publications and enough copies are to

be run to supply single copies to interested workers who request them individually.

Numbers resemble Wildlife Leaflets in format, but whereas Wildlife Leaflets are correspondence aids, these leaflets are more or less monographic treatments of practical subjects. Numbers now available are:

No. 1 (Revised). Anon. PROPAGATION OF WILD DUCK FOODS. 23 p. April 15, 1949.

No. 1A. Anon. DEVELOPMENT AND MANAGEMENT OF DIKE COVER. 29 p., 1 map. April 24, 1950.

No. 7. Anon. COVER TYPE MAPPING. 12 p., 3 figs. March 15, 1946.

No. 12. Anon. IMPROVEMENTS IN THE CANNON NET TRAP. 27 p., 9 figs., 6 pl. Dec. 1955.

No. 13. Kirsch, Leo M. SPRING GROUSE CENSUS AND HABITAT INVENTORY METHODS. 7 p., 2 figs. Feb. 10, 1956.

No. 14. Halloran, Arthur F., and Oscar V. Deming. WATER DEVELOPMENT FOR DESERT BIGHORN SHEEP. 12 p., 5 figs. July 20, 1956. [Formally published in J. Wildl. Mgt. 22(1), Jan. 1958.]

No. 15. Anon. THE RESTORATION OF BREEDING CANADA GOOSE POPULATIONS ON NATIONAL WILDLIFE REFUGES. 21 p., 2 figs. Feb. 4, 1958.

WILDLIFE MONOGRAPHS. Published irregularly by Wildlife Society. No. 1, 32 p., 4 figs., Mar. 1958.. Distributed without extra charge to recipients of J. Wildl. Mgt. Copies may be purchased (price not stated) from Wildl. Soc. Secretary, J. P. Linduska, Remington Farms, Chestertown, Md.

A new series designed for valuable wildlife papers that are too long for the J. Wildl. Mgt. Each issue is financed by contributions from individuals and foundations, or from agencies that sponsored the research. The first number is "Field-feeding by waterfowl in southeastern Manitoba," by E. F. Bossenmaier and Wm. H. Marshall.

## WILDLIFE--BIOTAS, ECOLOGY, NATURAL HISTORY

Devlin, Joseph M. (Zool. Garden, Phila. 4, Pa.) OUR CHANGING CLIMATE. Bul. Mass. Aud. Soc. 41(8): 424, 426, 456. Nov. 1957.

Perhaps our climate is becoming warmer, but much evidence that has been advanced to prove it is unsound. True, southern plants and birds have moved northward, but many northern ones have moved southward at the same time. With birds of the Philadelphia region, southward movement of northern elements is the more spectacular. Some biotic changes commonly attributed to climate actually reflect only habitat changes caused by man.

Hutchinson, G. Evelyn. (Yale U.) A TREATISE ON LIMNOLOGY. VOLUME I. GEOGRAPHY, PHYSICS, AND CHEMISTRY. John Wiley & Sons, 440 Fourth Ave., N. Y. 16, N. Y. xiv + 1015 p., 228 figs., 1 pl., 129 tables. 1957. $19.50.

A detailed reference that may fairly be termed epochal and encyclopedic. "The aim of this book is to give as complete an account as is possible of the events characteristically occurring in lakes... In order to make the work as useful as possible to these and other scientists directly or indirectly concerned with lakes, a number of ancillary matters have been considered in detail. In choosing what collateral matter to elaborate, the author has been guided by the availability of other modern accounts, and has tried to provide discussions of subjects that most biologists or geologists would find difficult to obtain elsewhere. In developing such accounts he has endeavored to follow the principle that what he has himself found perplexing has probably perplexed other investigators. ...at the end of each chapter an undocumented factual summary of all the main conclusions has been given. It is hoped that the elementary student may find that these summaries, taken together, provide a simple account of what is actually known about lakes." Users of the book will profit from good background in physics, chemistry, and mathematics. Chapters take up origin of basins, morphometry, properties of water, hydrological cycle, hydromechanics, optics, thermal properties, inorganic ions, oxygen, carbon dioxide, pH, redox potential and iron, phosphorus cycle, sulfur cycle, silica cycle, minor metals, nitrogen cycle, and organic matter. The book closes with a 10-p. list of symbols, a 66-p. bibliography and author index, and indices to lakes and subjects. The second and presumably final volume will deal with limnobiology and the ecological, typological, and stratigraphic problems of lake development.

Jaeger, Edmund C. THE NORTH AMERICAN DESERTS. Stanford U. Press, Calif. x + 308 p., illus. 1957. $5.95.

A semipopular guide to deserts and desert life in the U. S. and Mexico. Travellers and visiting biologists should find it a worthwhile interpretive aid. The first chapter tells what makes deserts and how plants, animals, and Indians live in them. The second chapter is a good account by Peveril Meigs of weather and climate in our different desert areas. Much of the book consists of chapters on particular deserts: Chihuahuan, Sonoran, Desert Plains and Foothills of Sonora, Sahuaro, Yuman, Colorado, Vizcaino-Magdalena, Gulf of California Coast, Mohave, Great Basin, and Painted Deserts. These chapters tell where the deserts are, what they are like, and give interesting information about their plants, animals, and Indians. The information is popularly presented, but has enough technical meat to be of substance. A large section of the book (p. 166-297) takes up characteristic insects, reptiles, birds, mammals and plants, with sketches and brief paragraphs about species. These accounts can treat few species of any 1 group, but should be of value in learning about some of the interesting forms. Many good photographs are scattered through the volume. Maps show locations of the areas described. The book is, as it is intended to be, a real invitation to travel, observation, understanding, and appreciation. It has an index and a list of selected references.

Lindroth, Carl H. THE FAUNAL CONNECTIONS BETWEEN EUROPE AND NORTH AMERICA. John Wiley & Sons, 440 Fourth Ave., N. Y. 16, N. Y. 344 p., illus. 1957. $15.00. [From review by W. H. Camp, A.I.B.S. Bul. 7(5).]

Discusses animals unintentionally introduced by man as well as the pre-human relationships between European and American faunas. Parts of the book are based on studies of carabid beetles, on which author is expert. Lindroth rejects the theory of continental drift but favors a Pleistocene land-bridge via Scotland, Iceland, and Greenland. He points out that the real break between faunas of Eur. and Am. comes between Greenland and Baffin Island. The book includes a 110-p. list of land and freshwater animals common to Eur. and Am.

Neill, Wilfred T. (Ross Allen Reptile Inst., Silver Springs, Fla.) HISTORICAL BIOGEOGRAPHY OF PRESENT-DAY FLORIDA. Bul. Fla. State Mus., Biol. Sci., 2 (7): 175-220. Dec. 1957. 60¢.

A detailed discussion of distribution and endemism of many Floridian animals and plants in relation to Pleistocene topography, coastal submergence, climatic conditions, faunal origins, and other factors. Seven biogeographic areas are recognized in the state; their faunas and floras are discussed. Includes 12-p. list of references.

Pruitt, Wm. O., Jr. (Box 282, College, Alaska.) OBSERVATIONS ON THE BIOCLIMATE OF SOME TAIGA MAMMALS. Arctic 10(3): 130-138, 3 figs. 1957.

Temperatures at different levels from open air to 9 inches under moss were studied for 2 winters and 1 summer on a forested plot near Fairbanks, Alaska. Temperature variation at different levels is reported in detail, with special reference to the blanketing effect of snow. The environment beneath the forest floor is relatively stable in temperature--comparatively warm in winter and cool in summer. Nine inches below the surface, temperature varied only 27°F. during the study period, while above ground it varied 152°F. This is extremely important to small mammals of the taiga. So is the fact that there is little snow and hence little insulation under dense conifers. Pruitt points out briefly some other significant factors that prevail under snow and moss: saturated atmosphere (believed vital to some shrews), extreme silence in which all disturbance is heard clearly, and lack of variation in light. Above ground, animals are handicapped by extreme temperature range, impediment of snow underfoot, and the problem of trees laden with snow. [Another paper in the same issue of Arctic also gives valuable data on conditions underground and under snow. It is by D. K. Brown Beckel, "Studies on seasonal changes in the temperature gradient of the active layer of soil at Fort Churchill, Manitoba," p. 151-183, 13 figs.]

Pruitt, Wm. O., Jr. (Box 282, College, Alaska.) QALI, A TAIGA SNOW FORMATION OF ECOLOGICAL IMPORTANCE. Ecology 39(1): 169-172, 2 graphs. Jan. 1958.
From summary: "2. The ecological importance of one taiga snow formation (qali--the snow that collects on trees) and its role in controlling one of the vegetational associations of interior Alaska are discussed. 3. A method for standardizing qali observations is described." The association described as controlled by qali is white spruce. Qali is important in ecology of arboreal animals, as pointed out briefly here and more fully in paper yet to be published.

Stohler, Carl M. THE BIRDS AND MAMMALS OF PINE SWAMP VALLEY, HUNTINGDON COUNTY, PENNSYLVANIA. M. S. thesis, Pa. State U. 1955.--P. F. English.

Taylor, Clyde C., Henry B. Bigelow, and Herbert W. Graham. CLIMATIC TRENDS AND THE DISTRIBUTION OF MARINE ANIMALS IN NEW ENGLAND. US F&WS, Fishery Bul. 115. iii + 293-345 p., 29 figs. 1957. 40¢ from Supt. Documents.
A long-term upward trend in air and sea temperatures is evident in New England records, especially for winter temperatures. The water column has warmed 1-5°F. in the Gulf of Maine since the period 1912-26. Catches of fishes and commercial crustaceans reflect the change. General fauna of the Gulf, however, has not changed.

Urquhart, F. A., editor. CHANGES IN THE FAUNA OF ONTARIO. Publ. by U. Toronto Press for Roy. Ont. Mus., Toronto. iv + 75 p., 15 figs. 1957. $1.50, paper.
Six papers, all but 1 documented, on distributional, environmental, and climatic changes in Ont. E. M. Walker discusses the insect fauna with special reference to Orthoptera. His facts favor the hypothesis of recent warming and drying. E. B. S. Logier reviews changes in distribution of certain reptiles, with emphasis on shrinkage of rattlesnake ranges. W. B. Scott tells of range extensions and introductions of fishes. L. L. Snyder gives much information on birds: extirpations, fluctuations of ranges, introductions, and range expansions. 65% of range extensions have been from s. to n. This is attributed in part to land-use changes and in part to unknown factors, perhaps climatic. R. L. Peterson provides a detailed discussion, with 10 maps, of changes in ranges and numbers of the larger mammals. He emphasizes post-glacial dispersal routes and does not mention land-use trends as a factor. M. K. Thomas contributes an authoritative but readable account of climatic changes. There have been major climatic fluctuations since glacial times, but there is no evidence of major changes during the Christian Era. On the other hand, a minor but significant change has occurred in the last century: records for s. Ont., corrected for "city effect," demonstrate an increase of about 3°F. per century and a decrease in precipitation of 3-4 inches. In other words, the climate of s. Ont. is a little warmer and drier than it was a century ago. The question of how much of this change can be attributed to alterations in land use and vegetative cover is not discussed.

Varley, G. C. (Oxford U., Eng.) ECOLOGY AS AN EXPERIMENTAL SCIENCE. J. Anim. Ecol. 26(2): 251-261, 1 graph. Nov. 1957.
A stimulating article that urges ecologists to take advantage of the thousands of ready-made experiments created by land-use changes, introductions of exotics, grazing, erosion, interactions between plants and animals, and soil phenomena. Areas of confusion in population dynamics are also discussed. Many interesting and informative examples are given. Varley feels that ecologists tend to be overly concerned with remote places and descriptive studies.

## WILDLIFE--NATURAL AREAS & REFUGES

Anon. ESTABLISHMENT OF ARCTIC BIRD SANCTUARY. Aud. Mag. 60(1): 35, 1 map. Jan.-Feb. 1958. (Reprinted by Aud. Mag. from news release of Can. Dept. N. Affairs & Natl. Resources.)
The Dewey Soper Bird Sanctuary of 3,150 sq. mi. has been established on Baffin Is. It is rated as the most important summer goose area in the world. It protects the heart of important breeding grounds for blue and snow geese. Am. brant and Hutchin's goose also breed there. Hunting will be prohibited in the sanctuary. Mineral development can be made under protective stipulations.

Bray, J. Roger. (U. Minn., Minneapolis.) PRESERVATION OF NATURAL AREAS / THE NECESSITY OF CONTROLLED DISTURBANCE. Naturalist (Nat. Hist. Soc. Minn., 315 Med. Arts Bldg., Minneapolis 2.) 8(3): 117-119, 1 photo. Fall 1957.
"The tendency of natural features to change, and especially for plant and animal communities to undergo succession, is noted. The preservation of pioneer and intermediate species through the controlled creation of disturbance is suggested as being as necessary as the preservation of climax species through protection from disturbance. A management scheme which uses disturbance, protection from disturbance, and combinations of both is presented as likely to result in the greatest preservation of the wide variety of physical and biologic features compatible with a given area. Two early intermediate species, white oak and red pine, are discussed in detail and the apparent necessity of fire in their preservation is noted."

Ehrenreich, John Helmuth. MANAGEMENT PRACTICES FOR MAINTENANCE OF NATIVE PRAIRIE IN IOWA. Doctoral thesis, Iowa State Coll. 1957. [From long abstract in Iowa State Coll. J. Sci. 32(2).]
Two isolated tracts of virgin prairie were purchased for preservation by Iowa State Cons. Comm. Complete protection, burning, and mowing experiments directed toward a management plan were evaluated by clipping vegetation, measuring stalk frequency and height, taking soil and air temperatures, and determining water content, pH, organic material, and chemical composition of soils. Grazing was considered too severe a practice in this area. Management recommendations: mowing 2/3 of each tract each year in early autumn, leaving certain critical areas unmowed; or, preferably, mowing as required, with occasional burning to promote seed production of native species.

Funk, John L. (Mo. Cons. Comm.) THE PAST FOR THE FUTURE / THE STORY OF THE NATURE CONSERVANCY. Mo. Cons. 19(2): 4-7, 5 figs. Feb. 1958.
Popular account of how Nature Conservancy operates to save samples of natural conditions, and list (with map) of 37 areas proposed for preservation in Mo.

International Union for Conservation of Nature and Its Resources. DERNIERS REFUGES / ATLAS COMMENTÉ DES RÉSERVES NATURELLES DANS LE MONDE. Elsevier (Paris, Bruxelles, Amsterdam). 214 p., 51 pl., maps & drawings. 1956. $10.50, cloth.
In French. A major report on the world's nature reservations. It is beautifully illustrated with photographs of landscapes, animals, and plants and has many maps showing locations of preserves. Text is interesting and highly informative. Most of it is devoted to a country by country survey that tells what the status of nature preserves is in each land, gives information about many of the reserves, lists most of the rest, and discusses certain major ones at length. Completeness is best for countries or colonies where there are few reserves, and is least for countries such as U. S. where there are too many refuges, forests, and the like to be mentioned individually. For such countries, emphasis is on national parks. Introductory chapters discuss the role of preserves in scientific research, in conservation of species and communities, and in relation to industrial development. One chapter tells the history of nature protection, and another discusses the economic importance of non-inviolate reserves such as U. S. refuges. The book should be useful and attractive to any naturalist who can read even a little French, and it should be an indispensable reference for those concerned with international nature protection.

Kirch, Wayne E. (Nev. Game Comm.) BIG GAME REFUGES VS. BIG GAME MANAGEMENT. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 130-133. 1957.
Maintains that all big-game refuges in U. S., aside from those for bison, should be abolished and the animals placed under state management. Money saved should be spent on waterfowl management.

Murphy, Richard Ernest. LAND OWNERSHIP IN THE WILDERNESS AREAS OF THE U. S. NATIONAL FORESTS. Ph.D. thesis, Clark U. 587 p. 1957. [From long abstract in Dissertation Abstracts 18(1).]
Nineteen of our 29 wilderness areas include parcels of private land that are used commercially in ways that often detract from the wilderness areas. Sometimes they have caused the boundary of a wilderness area to be pulled back. Sometimes they have been reacquired by Forest Service or by state game departments. "The best chances for success in preserving the wilderness areas from

the threat of alienations are (1) an aroused and vocal local citizenry and (2) an interested and sympathetic Forest Service staff. The latter can help by making use of every opportunity to acquire the alienations and by enforcing regulations where possible. The local citizen can bring pressure to bear on state legislatures and on the Federal government for protective laws and appropriations to buy the alienations."

Wheat, Maxwell, Jr. BIG CITY SANCTUARY. Nat. Mag. 51(1): 34-37, 6 photos. Jan. 1958.

Jamaica Bay, N. Y. City, polluted and speckled with trash, was to become a vast harbor or a huge dump. Instead, the N. Y. Dept. Parks has transformed and restored it into a wildlife sanctuary that already has large numbers of interesting birds and has won the praises of conservationists. This article tells how it was done, credits some of the people responsible, and mentions some of the birds.

## WILDLIFE--NATURE PROTECTION & RARE & EXTINCT SPECIES

Allen, Robert P. (Natl. Aud. Soc., Box 205 Tavernier, Fla.) AN URGENT APPEAL FOR INFORMATION ON THE WADING BIRDS. Aud. Field Notes 11(6): 458-460. Dec. 1957.

Herons, ibises, and their relatives have been losing ground with catastrophic speed in the last few years. Drought, drainage, and development seem responsible. Most breeding grounds are now abandoned in Fla., even in Everglades Park. Upsurges of southern waders in the North were temporary and coincided with abandonment of areas in South. Allen describes this alarming situation in some detail and appeals for cooperation in listing all breeding colonies in N. Am. and their population trends. Questionnaire blanks will be sent by Allen on request.

Lamb, George R. THE IVORY-BILLED WOODPECKER IN CUBA. Pan-Am. Sec., Internatl. Committee Bird Preservation, Res. Rep. no. 1. iii + 17 p., 8 pl., proc. Dec. 1957. Available from S. D. Ripley, Peabody Mus., Yale U., New Haven, Conn.

Once widely distributed in Cuba, the ivory-bill is now down to 12 birds in 1 part of 1 province. Land clearing, lumbering, and persecution were responsible. The birds persist chiefly on lateritic soils bearing pine. They show some adaptability to cut-over areas. Two U. S. corporations, Bethlehem Steel and Freeport Sulphur, own much of the land in question and will make efforts to help the birds. Warden service, education, nest boxes, and refuges are recommended. The paper presents what is known about habitats, habits, foods, cruising range, roost sites, and related matters.

Lamb, George R. ON THE ENDANGERED SPECIES OF BIRDS IN THE U. S. VIRGIN ISLANDS. Pan.-Am. Sec., Internatl. Committee Bird Preservation, Res. Rep. no. 2: 1-5, proc. Dec. 1957. Available from S. D. Ripley, Peabody Mus., Yale U., New Haven, Conn.

Colonial sea-birds and their nesting sites in the Virgin Islands are listed. Sites are tiny cays owned by government, but unprotected from regular commercial exploitation for eggs and young. It is urged that Bureau of Sport Fisheries and Wildlife be placed in charge, and that colonies become tourist attractions. Lack of protection has reduced sole breeding colony of White-crowned Pigeons to 300. The colony is shot heavily during breeding season and is being wiped out. Better law enforcement is necessary, but would be unpopular. U. S. Migratory Bird Act does not apply to Virgin Islands, conservation is not understood, and protection of birds is nearly impossible.

Pough, Richard H. (33 Highbrook Ave., Pelham, N. Y.) REPORT OF COMMITTEE ON ENDANGERED SPECIES OF WILDLIFE. 47th Conv. Internatl. Assn. Game, Fish & Cons. Comms. p. 46-49. 1957.

This report and the long discussion that follows it give information on progress made in preserving many species and on problems involved. Wis. has rescinded the bounty on wolves. Colo. tries to move livestock out of an area where there is a stock-killing grizzly. Hawaii has acquired a sanctuary for the nene. Certain ranchers are preserving the Atwater prairie chicken. Prairie

chickens in general are receiving much study. Fla. made it illegal to kill any hawk in range of Everglades kite, and then prohibited killing of any hawks or owls in Fla. Pa. has made great progress in protecting hawks. Utah is acquiring land for the Columbian sharp-tailed grouse. Minn. has acquired lands for prairie chickens and has arranged regulations on sharptails to cut down kill of prairie chickens. Minn. still has 500-700 wolves and is trying to get rid of bounty on them. Introduced wolves have taken hold on Isle Royal and should help control moose in that park. There are resident caribou in Idaho. Mont. has a population of grizzlies, thanks to National Forest wilderness where there is no livestock. Canada is protecting the musk ox as fully as possible and believes the animal is increasing a little. Barren-ground caribou are decreasing despite intensive study and moderate wolf control. Ont. finds that its bounty is working out well for the wolf population.

Talbot, Lee Merriam. (Berkeley, Calif.) THE LIONS OF GIR: WILDLIFE MANAGEMENT PROBLEMS OF ASIA. Trans. 22nd N. Am. Wildl. Conf. p. 570-579, 3 figs. 1957.

"The relationship between land abuse and the wildlife picture shown so vividly by the Gir applies to much of India, and in principle, to much of Asia." "Destroying animals is an important cause [of wildlife decline], but destroying their habitat is a much more important cause. This destruction takes many forms, but they all add up to abuse of the land. Overcutting, overgrazing, erosion and the consequent loss of water all have their impact on the wildlife, regardless of hunting pressure." The Gir is one of the last surviving forests in western India. It has shrunken from 1200 miles to 480 miles since 1880 owing to steady deterioration of land, primarily through overgrazing. There is no underbrush and no forest reproduction and no cover except for a little along streams. The forest is being replaced by scrub and desert at such a rate that it will be eliminated in 20 years. Lions have been protected since 1900 and have increased from 12 to 290. They feed on livestock, as almost no game exists. The lions are now becoming a political problem. The situation seems hopeless for wildlife and the land.

## WILDLIFE--MORPHOLOGY, PHYSIOLOGY, BEHAVIOR, MIGRATION

Scott, John Paul. (Jackson Mem. Lab., Bar Harbor, Me.) ANIMAL BEHAVIOR. U. Chicago Press. xi + 281 p., 33 figs. + 16 p. of photos. 1958. $5.00.

This book is so smoothly written, and so well supplied with well-integrated illustrative examples that the reader is apt to forget that it is a text and read it for enjoyment. It is, however, intended primarily as an elementary college textbook of animal behavior, and as such has some of the definitions, categories, and classifications common to textbooks. The writing is marked by a realism that could scarcely be achieved by a person not himself engaged in research work, and includes a number of thought-provoking comments concerning problems involved in planning experiments. As to the conflict between ethologists and psychologists, Scott uses material from both but does not follow ethological theory. Wildlife biologists should particularly enjoy chapters 5-10, which discuss the relationships between behavior and learning, heredity, intelligence, sociality, and communication. These chapters are highlighted by numerous insights into Dr. Scott's own extensive work on animal behavior, especially that of dogs. The four introductory chapters are concerned with animal behavior in relation to human behavior, methods of study, and the effects of anatomy and physiology on behavior. The final two chapters briefly discuss behavior in relation to environment and to evolution. Each chapter is summarized. A good list of references and an index are included in the book.--L. F. Stickel.

## WILDLIFE--EFFECTS OF CHEMICALS, WEATHER, CARS, ETC.

Anon. EFFECTS OF DDT SPRAYING ON YOUNG SALMON AND THEIR FOOD. Atlantic Salmon J. no. 4: 33-34. Dec. 1956. [From long abstract in Sport Fishery Abs. 2(4).]

"Sampling of stream insects produced on sprayed and unsprayed areas was carried out as in 1955. Studies have been made also of the stomach contents of young salmon of all sizes collected as samples in various parts of the Northwest

Miramichi River. It is clear that the 1954 spraying had serious effects on the stream insects, and these effects were still apparent in 1956. Many of the larger kinds of stream insects, for example the caddisflies, were eliminated in 1954 and have not yet returned. Some species of flies, for example midges, have increased greatly in the years following spraying, but the total volume of all insects is lower in the sprayed areas than in the unsprayed areas. The midges may be taken efficiently by small salmon fry, but are not efficiently utilized by small and large parr. This likely accounts for the very poor condition observed in the small parr seined this autumn. The 1956 spraying affected the stream insects similarly to the spraying in 1954. It is important to emphasize once again that young salmon are killed directly by the DDT reaching the water, which accounts for the heavy mortalities of fish shortly after spraying. The reduction of stream insects which constitute the food of young salmon can be expected to have later effects on the fish. This likely lessens their chance for survival a few months after the spraying."

Burden, E. H. W. J. A CASE OF DDT POISONING IN FISH. Nature 178(4532): 546-547. Sept. 8, 1956. [From abstract in Sport Fishery Abs. 2(4).]

"...large numbers of fish were killed. The poison used was an emulsifiable oil containing 30 percent DDT and 0.5 percent 'Lissapol.' A spray calculated to give a DDT content of 0.09 ppm. was used. The concentration of DDT at a point 10 miles downstream from where the spraying took place was 0.017 ppm. Eight miles downstream from the area sprayed hundreds of fish were reported dying. Two specimens of fish examined were found to have definitely died of poisoning... These results lend support to previous work showing that fish are highly sensitive to DDT and that non-fatty animals are more sensitive than fatty ones."

DeWitt, James B., and Paul F. Springer. (Patuxent Refuge, Laurel, Md.) CHEMICALS AND WILDLIFE. Natl. Agr. Chem. Assn. News & Pesticide Rev. 16(1): 13-14, 1 photo. Dec. 1957.

Short paper that reviews some of the facts about effects of insecticides on wildlife and states principles that should be followed for maximum safety in treatment. These principles include minimal doses, good ground-to-plane control to avoid overdoses, and least possible pollution of water areas.

Fashingbauer, B. A. (Minn. Dept. Cons., Grand Rapids.) THE EFFECTS OF AERIAL SPRAYING WITH DDT ON WOOD FROGS. Flicker 29(4): 160. Dec. 1957.

One lb. of DDT per acre was applied for control of tent caterpillar in Hubbard Co., Minn. in 1951. Around 2 pools, 111 small Rana sylvatica were counted before spraying. The frogs seemed well a day after spraying, but water had oil film and was covered with poisoned caterpillars. Two and a half days later, 35 dead frogs were found, and a few days later no living ones remained. All but 2 of 34 frog stomachs contained tent caterpillars, among other insects. Whether frogs were killed directly or by eating poisoned insects, the local population was drastically reduced and perhaps totally eliminated.

Fashingbauer, B. A., A. C. Hodson, and W. H. Marshall. (Minn. Dept. Cons., Grand Rapids.) THE INTER-RELATIONS OF A FOREST TENT CATERPILLAR OUTBREAK, SONG BIRDS AND DDT APPLICATION. Flicker 29(4): 132-143, 146-147, 4 photos. Dec. 1957.

Three 14-acre plots of young aspen were selected in Hubbard Co., Minn., before defoliation began in 1951. One plot was outside the area of defoliation. One was defoliated by the caterpillars. The other was saved from defoliation by aerial application of 1 lb. DDT per acre in oil. Breeding pairs of songbirds in these plots numbered 4.0, 3.9, and 3.1 per acre, respectively. These differences were believed to represent habitat differences rather than spraying. No bird mortality and no sign of influx was noted. No significant difference in sizes of territories or behavior of birds was apparent. Usual nesting sites were used even in the defoliated plot; nests were less conspicuous there than would have been expected. Peak of hatching in this plot was, however, delayed 10 days. Nesting success was about 38% in defoliated plot, 46% in DDT plot, and 27% in check plot. Birds preyed only moderately on tent caterpillars, and only on smaller ones; they could have had little controlling effect. Real control was a parasite that infested 97-99% of pupae in defoliated plot. The DDT was also highly effective, but some swaths didn't get any. Data suggest that neither

the DDT treatment, at 1 lb. per acre, nor the defoliation had any marked effect on the birds; and that birds had little if any effect on the outbreak of caterpillars.

George, John L. (N. Y. Zool. Soc., N. Y. 60.) IT'S HIGH TIME WE SOLVE THE PESTICIDE PROBLEM. Animal Kingdom 61(1): 2-5, 5 photos. Jan.-Feb. 1958.
Brief article that points out the great dangers in wholesale use of pesticides, shows how little we know of their effects, and urges a vigorous effort to get answers.

Harrington, Robert W., Jr., and Wm. L. Bidlingmayer. (Ent. Res. Center, Fla. State Bd. Health, Vero Beach.) EFFECTS OF DIELDRIN ON FISHES AND INVERTEBRATES OF A SALT MARSH. J. Wildl. Mgt. 22(1): 76-82. Jan. 1958.
After treatment of 2000 acres of ditched tidal marsh in Fla. with pelleted dieldrin at 1 lb. active ingredient per acre, the fish kill was virtually complete (an estimated 20-30 tons, of at least 30 species). Mollusks appeared to be unharmed. Crustaceans were annihilated except for a few fiddler crabs (Uca spp.) spared by uneven coverage. Bi-weekly censuses along a 5600-foot ditch showed a repopulation climax 10 weeks after treatment, with Cyprinodon variegatus the dominant invader. The fish population commuting between the marsh and adjacent Indian River shallows was mostly destroyed, apparently including snook (Centropomus undecimalis). Kill of fish might have been just as extensive at 1/4 the dose used.--Authors.

Hoffmann, Robert S., Reuel G. Janson, and Fred Hartkorn. (Mont. State U., Missoula.) EFFECT ON GROUSE POPULATIONS OF DDT SPRAYING FOR SPRUCE BUDWORM. J. Wildl. Mgt. 22(1): 92-93. Jan. 1958.
The effect of 1-lb.-per-acre spraying of DDT for spruce budworm control on populations of 3 spp. of grouse (Dendragapus obscurus, Bonasa umbellus, Canachites canadensis) was studied. Data on numbers of grouse seen, numbers of broods seen, and size of broods were available for the period 1952-56. They showed no great change in 1955, the year of spraying, or in the following year, in either sprayed or unsprayed areas. On another area, DDT-sprayed in 1956, the proportion of young to adult grouse in hunter bags was as great as on unsprayed areas, suggesting no additional juvenile mortality resulting from this rate of DDT application.--R. S. Hoffmann.

Prychodko, Wm. (Inst. Cancer Res., 4811 John R. Street, Detroit 1, Mich.) WILD ANIMALS KILLED ON HIGHWAYS OF SOUTHEASTERN MICHIGAN. Säugetierk. Mitt. 5 (4): 151-156, 1 graph. Dec. 1957.
In German. Report on animals found dead on a 19-mi. section of U. S. Highway #12 over a 17-week period. Possible significance of results is discussed.

Stickel, Lucille F., and Paul F. Springer. (Patuxent Refuge, Laurel, Maryland.) PESTICIDES AND WILDLIFE. US F&WS, Wildl. Leafl. 392. 1-12 p., 1 photo. Dec. 1957.
Problems concerning the effects of pesticides and pesticidal programs on wildlife are summarized briefly in question and answer form. Principal currently used pesticides are listed along with indications of their relative toxicity to wildlife. Recommendations are made for methods of pesticide use that will minimize wildlife damage. Certain pesticidal programs and their potential wildlife danger are outlined. These include mosquito, gypsy moth, spruce budworm, Dutch elm disease, and Mediterranean fruit fly control programs, and the fire ant eradication program.--L. F. Stickel.

Stroud, R. H. SUPER INSECTICIDES--SPACE-AGE POLLUTANTS. Sport Fishing Inst. Bul. no. 74: 1-2. Jan. 1958.
The Dept. of Agriculture's fire ant eradication program calls for distribution of 2 lbs. per acre of dieldrin and heptachlor to more than 20 million acres of land in the SE. Danger of destruction of the sport-fishing resource, as well as the destruction of other kinds of animals, is pointed out, backed by data from experimental studies. In one, dieldrin distributed at only 1 lb. per acre in Fla. marshes resulted in substantially complete kill of fishes and crabs, including baby tarpon utilizing the salt marshes as nursing grounds. In addition to fish and wildlife damage, there is possibility of increase of pest insects whose natural enemies are destroyed, and the possibility, that despite all, the

fire ant will not be eradicated. "Important as the purpose is, [fire ant eradication] it is not important enough to risk destroying priceless fish and other wildlife in at least five states. Apparent ignorance (lack of adequate research) and poor planning (disregard for other equally vital assets) seem responsible... Ironclad safeguards are needed to prevent fearsome pollution of water and land habitat and to protect sport fishing in particular. Nationally, the sport fisheries support a $2 billions sport fishing industry. Well over $500 millions of this are generated in the threatened states."--L. F. Stickel.

Wolfe, H. R. ORCHARD MOUSE CONTROL WITH ENDRIN SPRAYS. State Coll. Wash., Ext. Cir. 282. 8 unnumbered p., 1 photo. Sept. 1957.

Recommends wetting ground cover well, so that 1.2 to 1.4 pounds actual endrin are applied per acre in 300 to 350 gallons of water. Cost per acre of endrin alone is about $13. The method is considered the best known. Season of application recommended is Oct. or Nov., for residual toxicity is lost faster in warm weather. Sprays applied in Nov. stayed effective well into winter. "Possibly an occasional quail or pheasant is killed by endrin sprays, but there has been little evidence of such deaths in the areas sprayed during the last three years. It is easy to overemphasize the hazard to game birds from sprays." [It is equally easy to brush off the hazard to wildlife, in general, not just game birds. The toxicity of endrin is so extremely high and lasting that careful tests of wildlife effects should be made.]

## WILDLIFE--PARASITES & DISEASES

Jungherr, E. L., and others. (U. Conn., Storrs.) INVESTIGATION OF EASTERN EQUINE ENCEPHALOMYELITIS. Am. J. Hygiene 67(1): 1-45, 3 figs., 2 pl. Jan. 1958.

A set of 5 papers on extensive and intensive studies of this disease in Conn.: I. General Aspects. II. Outbreak in Connecticut pheasants. III. Pathology in pheasants and incidental observations in feral birds. IV. Susceptibility and transmission studies with virus of pheasant origin. V. Entomologic and ecologic field studies.

Among many other things, these papers discuss bird-to-bird transmission in nature and in pheasant farms, possible role of mosquitoes and wild rodents in spread of the disease, and control of the disease in pheasant farms.

## WILDLIFE--POPULATIONS & FLUCTUATIONS

Blackith, R. E. (Imp. Coll. Field Sta., Sunninghill, Berks., Eng.) NEAREST-NEIGHBOR DISTANCE MEASUREMENTS FOR THE ESTIMATION OF ANIMAL POPULATIONS. Ecology 39(1): 147-150. Jan. 1958.

Discusses practical tests of Craig's formula and the Clark-Evans formula. Experiments with grasshoppers, reported here, indicate that Craig's method is often superior, although less simple.

Zippin, Calvin. (U. Calif. Sch. Med., San Francisco.) THE REMOVAL METHOD OF POPULATION ESTIMATION. J. Wildl. Mgt. 22(1): 82-90, 3 figs. Jan. 1958.

The assumptions (stationary population, equal probability of capture per trapping for all animals exposed to capture, probability of capture remains constant from trapping to trapping) underlying the removal method of population estimation were reviewed and a graphical method of estimation was recommended and described. If the assumptions of the method hold, the precision of a population estimate is primarily dependent on the proportion of the population captured, or the total number of units of trapping effort employed in the program, and relatively little on the number of trappings. Relatively large proportions of the population must be captured in order to obtain precise estimates of population size. Specific effects of failures in the basic assumptions, such as a decrease in the av. probability of capture from one trapping to the next, and immigration into the trapping area during the trapping program were described. Where the assumptions of both the removal and recapture methods of population estimation are met, the recapture method would be expected to give more precise results. The assumption of a constant probability of capture was studied using data from the North American Census of Small Mammals. To compensate for an indicated departure from this assumption under actual trapping conditions, the standard error formula should be inflated. An inflation factor of 1.2 was suggested for the data studied.--Author.

WILDLIFE--BIOMETRICS

Anonymous. QUERY 50 [Browse sampling.] Biometrics 3(2): 101-103. June 1947.
Discusses correct procedure in sampling deer browse. The person submitting the query is interested in selecting traverse lines that extend at right angles to a stream bed or valley. Study plots are to be selected on each line. Aim is to appraise existing supply and ascertain yearly changes in supply. The problem involves random selection of lines and plots. F. X. Schumacher discusses sampling procedure on the basis of each of these objectives. His discussion should be of value to persons interested in studies of this type. Readers need not be familiar with statistical procedure to interpret the conclusions presented.--V. Schultz.

Bradley, Ralph A., editor. SPECIAL ISSUE ON THE ANALYSIS OF COVARIANCE. Biometrics 13(3): 261-431. Sept. 1957. $2.00 from Biometrics, Dept. Statistics, V.P.I., Blacksburg, Va.
Contains 7 articles on covariance. These are listed below. The papers of Cochran and Smith are of most value to wildlife biologists.
Cochran, Wm. G. (Harvard U.) Analysis of covariance: its nature and uses.
Smith, H. F. (N. C. State Coll.) Interpretation of adjusted treatment means and regressions in analysis of covariance.
Zelen, M. (Natl. Bur. Standards.) The analysis of covariance for incomplete block designs.
Federer, W. T. (Cornell U.) Variance and covariance analyses for unbalanced classifications.
Wilkinson, G. N. (Div. Math. Stat., C.S.I.R.O., Adelaide, Australia.) The analysis of covariance with incomplete data.
Finney, D. J. (U. Aberdeen, Scotland.) Stratification, balance and covariance.
Coons, I. (Westinghouse Elec. Corp., E. Pittsburgh, Pa.) The analysis of covariance as a missing plot technique.--V. Schultz.

Cox, D. R. (Birkbeck Coll., U. London.) NOTE ON GROUPING. J. Am. Stat. Assn. 52(280): 543-547. Dec. 1957.
Presents a procedure for determining grouping intervals when variate is normally distributed.--V. Schultz.

Fager, Edward W. (Scripps Inst., La Jolla, Calif.) DETERMINATION AND ANALYSIS OF RECURRENT GROUPS. Ecology 38(4): 586-595, 1 fig. Oct. 1957.
Summary: "A new index of affinity between species, based on presence and absence, is proposed and a table is provided from which the significance of an observed number of joint occurrences can be estimated. Using this index and a four-part definition of a recurrent group, a procedure is outlined which leads to the largest, most frequent, separate groups within which all species formed a nearly constant part of each other's biological environment. Ranking methods are suggested for the examination of interspecific concepts such as numerical dominance, relative abundance, concordance and correlation within these groups."

Kendall, Maurice G., and Wm. R. Buckland. A DICTIONARY OF STATISTICAL TERMS. Oliver and Boyd, London. ix + 493 p. 1957. 25s.
Was prepared at invitation of Internat. Stat. Inst. Its function is to provide an explanation of terms in current use. It should be of aid to wildlifers in reading as well as in preparing manuscripts. It is more than a dictionary, for extensive discussions accompany terms. Equivalent terms are presented in French, German, Italian and Spanish. This relatively inexpensive book should be in every researcher's library.--V. Schultz.

Mandel, John. FITTING A STRAIGHT LINE TO CERTAIN TYPES OF CUMULATIVE DATA. J. Am. Stat. Assn. 52(280): 552-566. Dec. 1957.
Involves linear data of measurements made at progressive stages of a process where errors are not independent. Ordinary regression methods applied to wildlife data imply independent errors, often an incorrect assumption.--V. Schultz.

Schultz, Vincent. (U. Md., College Park.) A STATISTICAL EVALUATION OF THE RELIABILITY OF HUNTER BAG CHECK DATA. Md. Agr. Exp. Sta. (College Park), Misc. Publ. no. 304, Contrib. no. 2862. 1-43 p., 5 figs., proc. 1958.

Contains a brief review of literature on hunter-kill statistics and a statistical study of hunter-bag-check data collected in Tenn. during 1954-55 hunting season. Quail, rabbit and squirrel bag-check data, collected in 2 relatively homogeneous hunter- and game-population regions in Tenn., are studied on a county basis within these regions. 2,712 bag checks from 12 counties, including 1,025 complete-bag checks and 1,687 incomplete-bag checks, are utilized. Statistics applied are common tests such as Chi-square, analysis of covariance, and analysis of variance. Results indicate that extreme county differences observed in various aspects of the data should be attributed to biased sampling procedures by conservation officers rather than to county differences in hunter and/or game populations. It is concluded that use of judgment sampling results in biased hunter-bag-check data. Various aspects of analysis of such data are discussed from a statistician's point of view.--V. Schultz.

Silverstone, H. (U. of Otago, New Zealand.) ESTIMATING THE LOGISTIC CURVE. J. Am. Stat. Assn. 52(280): 567-577. Dec. 1957.

Considers binomial response data.--V. Schultz.

Books on design of experiments

In recent years wildlife biologists have become interested in applying statistical techniques to their data. Such applications have involved tests of significance and estimation procedures, but very little use of experimental design. This reflects unfamiliarity with the method, and the belief that field studies are not amenable to statistical design. Although this is partly true, wildlife research workers should be aware of this field of statistics and should apply experimental designs when feasible.

The books on experimental design listed here are the major ones. Finney's book is very elementary and readable; Kempthorne's is primarily theoretical. Both Quenouille and Cochran and Cox deal with application and interpretation and should be consulted by persons wishing to apply an experimental design. Federer's book is somewhat intermediate between the latter 2 books and Kempthorne's. Davies, although referring to industrial examples, presents an excellent discussion of designs.

Unfortunately, whatever book is consulted, the reader should have an excellent background in basic statistics. Finney's book is the sole exception.--V. Schultz.

Cochran, Wm. G., and Gertrude M. Cox. EXPERIMENTAL DESIGNS. John Wiley & Sons, N. Y. xiv + 611 p., + 5 p. tables. 2nd edition, 1957. $10.25.--V. Schultz.

Davies, Owen L., editor. DESIGN AND ANALYSIS OF INDUSTRIAL EXPERIMENTS. Oliver and Boyd, London. xiii + 637 p. 1954. 63s.--V. Schultz.

Federer, Walter T. EXPERIMENTAL DESIGN. Macmillan, N. Y. xix + 544 p., + 47 p. problems. 1955. $11.00.--V. Schultz.

Finney, D. J. EXPERIMENTAL DESIGN AND ITS STATISTICAL BASIS. U. Chicago Press. xi + 169 p. 1955. $4.50.--V. Schultz.

Fisher, R. A. THE DESIGN OF EXPERIMENTS. Oliver and Boyd, London. xv + 244 p. 6th edition, 1951. 12s/6d.--V. Schultz.

Kempthorne, Oscar. THE DESIGN AND ANALYSIS OF EXPERIMENTS. John Wiley and Sons, N. Y. xix + 631. 1952. $10.00.--V. Schultz.

Quenouille, M. H. THE DESIGN AND ANALYSIS OF EXPERIMENT. Charles Griffin, London. xiii + 356 p. 1953. 36s.--V. Schultz.

WILDLIFE--TECHNIQUES

Anon. COVER TYPE MAPPING. US F&WS, Branch of Wildl. Refuges, Wildl. Mgt. Ser., Leafl. no. 7. 12 p., 3 figs., mimeo. Mar. 1946.

Not a complete mapping manual, but does present helpful suggestions on how to do practical cover mapping for refuge management.

Beer, James R., and Edwin F. Cook. (U. Minn., St. Paul 1.) A METHOD FOR COLLECTING ECTOPARASITES FROM BIRDS. J. Parasit. 43(4): 445. Aug. 1957.

Benson, D. A. (Nova Scotia Dept. Lands & For., Truro.) A MECHANICAL ANALYSIS OF HUNTERS' REPORTS. Presented at 1958 conf. NE. Sec. Wildl. Soc. et al. 10 p., 1 fig., mimeo. Jan. 1958.

Nova Scotia has a 6-week season on white-tailed deer. A hunter may shoot 2 regardless of sex. Resident hunters are legally compelled to report results, so game authorities get a virtually total report rather than a sample. Data are put on IBM cards for processing. The system is accurate and has public relations value. Tabular samples of results are given.

Cornwall, I. W. BONES FOR THE ARCHAEOLOGIST. Macmillan Co., N. Y. 257 p., illus. 1956. [From J. Mamm. 39(1).]

"A guide to bone identification."

Dore, W. G. (Sci. Serv., Can. Dept. Agr., Ottawa.) A SIMPLE CHEMICAL LIGHT METER. Ecology 39(1): 151-152, 2 figs. Jan. 1958.

Based on tubes of anthracene. "Summation readings can be obtained for periods of a few hours to a day or two, simultaneously in several places or in various niches of the habitat. An electric power supply is not needed and there is little danger of damage from the weather or from animals; readings may even be made in underwater habitats." After exposure, tubes are taken to laboratory and read with spectrophotometer.

Edgar, R. L. (Animal Ecol. Section, Dept. Sci. & Industrial Res., Wellington, N. Z.) A DEVICE FOR HOLDING RABBITS DURING X-RAY PHOTOGRAPHY. J. Wildl. Mgt. 21(4): 453-454, 2 photos. Oct. 1957.

Describes and illustrates device to hold rabbit while leg is x-rayed for age determination from epiphyses. There is no obstruction between subject and x-ray plate. One technician can handle 5 rabbits in 5 minutes.

English, P. F. (Pa. State U., U. Park.) AN ECONOMICAL WAY TO NUMBER LINES, PLOTS, AND QUADRATS. J. Wildl. Mgt. 22(1): 99. Jan. 1958.

Out-dated automobile license plates are cut up and the letters and numbers are nailed to stakes or trees either singly or in any desired combination.

Mayer, Wm. V. (Wayne U., Detroit 2, Mich.) A METHOD FOR DETERMINING THE ACTIVITY OF BURROWING ANIMALS. J. Mamm. 38(4): 531. Nov. 1957.

Rolled piece of smoked paper is placed in mouth of burrow, inspected periodically for signs of animal activity, and replaced as often as desired. Paper can be smoked in field with small benzine lamp.

Rutstrum, Calvin. THE NEW WAY OF THE WILDERNESS. Macmillan, 60 5th Ave., N. Y. 11, N. Y. ix + 276 p., illus. 1958. $4.50.

There are plenty of books on living outdoors, but this one makes most of them seem amateurish and outdated. Rutstrum has done and still does an enormous amount of wilderness travel, principally in Canada. He writes with everything from single back-packers to scientific expeditions in mind. He seems to know all the tricks, from the oldest to the newest, and he doesn't hesitate to adopt the newest supplies and equipment. His book crackles with practical advice. You might say it starts where some manuals leave off. For example, instead of just telling how to use a compass, it discusses problems and inadequacies of compass use. Instead of just telling how to find the North Star, it tells how to find true north by that star. Foil cookery has had a vogue; Rutstrom points out its shortcomings. Blankets are outmoded; Rutstrom tells how to select--or make--a really good sleeping bag. The three-quarter ax is popular; Rutstrom convinces us it is dangerous. Sections of the book cover back-packing, canoe travel, pack-horse trips, arctic traveling and camping, auto trips, orientation, tents and shelters, clothing, foods, recipes, cooking, fishing and hunting for food, survival, and wilderness medicine. Each section is jammed with good recommendations--the distillation of many trials. Lists of equipment and foods needed for different sorts of trips are provided. Pack hitches, sledge hitches, canoe strokes, and ax use are explained. Choice of canoes, how to sail joined canoes, use of outboard motors, how to cross broken ice, and scores of similar matters are discussed realistically. In short, the book is a gold mine of practical tips for traveling and living in wild country. Everything is treated concisely; elementals are given little space if commonly and satisfactorily treated in other books. No doubt experienced people will differ with the author

about various points, but we found only 2 things to object to: 1. The advice on treating snake-bite is bad. 2. Nothing is said, pro or con, about bottled-gas stoves and lamps, although many equally recent innovations are recommended or put in their place. There are many helpful drawings and there is an index, but no references are suggested.

Schroeder, Charles H. (N. Dak. Game Dept., Bismarck.) A CALCULATOR FOR HANDLING LARGE SERIES OF AGED-BROOD DATA. J. Wildl. Mgt. 21(4): 459-460, 1 fig. Oct. 1957.

Description and instructions for use of a calculator for the rapid handling of large series of waterfowl aged-brood data. The calculator is of a circular slide-rule type and is made of disks of light cardboard.--Author.

Taylor, Carlton F. (Pa. State U., U. Park.) A DEVICE FOR RECORDING THE DURATION OF DEW DEPOSITS. Plant Dis. Reporter 40(12): 1025-1028. 1956. [From Biol. Abs. 32(2).]

A device is described which records with high accuracy the starting time and the duration of dew deposits and is comparable to that on foliage under similar placement. The recording surface is a glass disc which is rotated by a 24-hour clock. An indelible pencil touches the disc and makes a conspicuous line only when the glass is wet. This instrument has proved to be dependable and rugged under field conditions. An application for patent was filed by the Federal Government in May, 1953, under the title "Dew Meter".--G. K. Parris.

## WILDLIFE--MANAGEMENT & RESEARCH, GENERAL

Arner, Dale Howard. EXPERIMENTAL SEEDING OF GRASSES AND LEGUMES FOR WILDLIFE UTILIZATION. M. S. thesis, Pa. State U. 1954.--P. F. English.

Casebeer, Robert L. (Idaho Dept. Game.) TAKING A LOOK AT A HABITAT IMPROVEMENT PROGRAM. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 265-270. 1957.

A discussion of opportunities and responsibilities for working habitat improvement into a wide variety of other land use programs. We must know just what to recommend when logging trails are to be planted, forests are to be cut, watersheds are to be developed, fields are to be burned, roadsides are to be sprayed, etc. We must get wildlife considered as one of the multiple uses to which most lands are put. "Having a good improvement project, plus actively participating in the many other land use programs which have an influence on game habitat production constitutes a habitat improvement program. As long as wildlife is produced on 'left-over' habitat, we can expect only a 'left-over' kind and abundance of wildlife. It is our responsibility to be dissatisfied with 'left-overs' and to make fish and game habitat management a part of the proper use of all lands."

Cottam, Clarence. (Welder Wildl. Found., Sinton, Texas.) THE ROLE OF PRIVATE AGENCIES IN CONSERVATION. 47th Conv. Internatl. Assn. Game, Fish & Cons. Comms. p. 74-80. 1957.

FORTY-SEVENTH CONVENTION OF THE INTERNATIONAL ASSOCIATION OF GAME, FISH AND CONSERVATION COMMISSIONERS--SEPT. 9-10, 1957--LAS VEGAS, NEV. 1-233 p. 1957. $2.00 from V. E. Joslin, 1356 N. Avon, St. Paul 13, Minn.

Important papers and group discussions on many vital subjects of current and lasting significance. This series of reports by leaders deals with critical, controversial problems and should be in every wildlife library. In the present volume, 3 papers take up government coordination in the fish and wildlife field. Three deal with financial aspects of licenses and the problems of reciprocal licenses. Four analyze problems, possibilities, and accomplishments under the Soil Bank laws. One paper tells of natural resource management on naval lands. One is a good discussion of the role of private agencies in conservation. One is a technical analysis of game stocking and its proper place. Informative committee reports, and discussions of them, pertain to national water policy, progress and problems in preserving endangered species, the federal aid program, changes in allocation of duck stamp funds, waterfowl needs, legislation, introduction and control of exotics, and the Soil Bank.

Gilfillan, Merrill C. (Ohio Div. Wildl.) IS STOCKING NECESSARY FOR GOOD HUNTING? Ohio Cons. Bul. 21(11): 7, 28-29, 33, 3 photos. Nov. 1957.

Stocking isn't necessary for good hunting, and it can be an expensive mistake. But it is valuable under certain conditions if used wisely. Ohio gets best results with game-farm pheasants by releasing them on state-owned areas near cities during the shooting season. Recovery rate is 85%, but sporting quality of the birds may be a little low. An advantage of this system is that hunting pressure can be built up because hunters know birds are being released during the season. The result is a higher degree of utilization of naturally produced game of all sorts on the areas. This can be achieved with relatively small releases. Another system Ohio finds promising is the cooperative pheasant program. Sportsmen's clubs provide large, open-topped pens in suitable pheasant country. The state provides 6-week-old, wing-clipped birds. Birds live in the pens until they can fly over the fence in range-hardened condition. The paper also discusses, concisely, all Ohio attempts to introduce or restock game birds and mammals, and the results of these attempts. So far, success can be claimed only for pheasant, Hungarian partridge (now only fairly successful), deer of 1 region, and beaver.

Leonard, Justin W. (Mich. Dept. Cons., Lansing.) AN APPRAISAL OF THE TWENTY-SECOND NORTH AMERICAN WILDLIFE CONFERENCE. Trans. 22nd N. Am. Wildl. Conf. p. 659-671. 1957.

Education, attrition, and experience have combined to remove wildlife management from the area of arts and crafts. Practically all action programs today are based on sound scientific knowledge. While many biological problems remain unsolved, continued research may be expected to yield increasingly rich rewards in fish and game abundance. Perhaps the most pressing problem facing conservationists today is the political and sociological question of how to obtain and hold adequate land and water areas for recreation, in the face of economic demands and population growth.--Author.

Lumsden, H. G. (So. Res. Sta., Dept. Lands & Forests, Maple, Ont.) THE PROBLEM OF CHANGING BELIEFS AND ATTITUDES. J. Wildl. Mgt. 21(4): 463-465. Oct. 1957.

Many good wildlife management programs fail to win public acceptance. Logical writing and lecturing does little good; it tends to harden opposing attitudes. Experts in human relations say that best results are obtained by low-pressure discussions with groups of about 6-7 persons. Discussion leader should not be in uniform and should not lecture. He should ask for help with problem, encourage discussion, answer questions, and unobtrusively feed factual information into the discussion. Attitudes of an individual depend largely on the views of the social group with which he is happy to identify himself. We should seek out and use suitable groups already subscribing to views we wish to promote, groups with which our subjects will be glad to identify themselves. Progress is difficult if such groups are lacking. Wildlife workers should cooperate with social psychologists to study people as assiduously as they study game animals. This makes excellent sense if, as is often said, 90% of game management is human management.

Mahaffey, Juanita. (Okla. Dept. Wildl. Cons.) DOES HATCHERY GAME BIRD STOCKING HELP HUNTING? Okla. Wildl. 14(1): 5-7, 14, 2 photos. Jan. 1958.

Survey, with table, of what each state game department is doing in artificial propagation, what the costs are, and what some of them think about it. Several states have quit artificial propagation and others are doing so. Many still have large programs, but these are now justified largely on grounds of providing put-and-take shooting--stocking for the gun--or for establishing new species. Barely mentioned here are the questions of whether cost per bird released for put-and-take shooting is economical in relation to license fees, and whether the money spent on propagation could be spent better elsewhere.

PROCEEDINGS OF THE THIRTY-SEVENTH ANNUAL CONFERENCE OF WESTERN ASSOCIATION OF STATE GAME AND FISH COMMISSIONERS, Glenwood Springs, Colo., June 17-19, 1957. xviii + 333 p., mimeo. 1957. $2.00 from Ben Glading, Calif. Dept. Fish & Game, 722 Capitol Ave., Sacramento 14, Calif.

A paper-bound volume that contains 67 consecutively paged papers on fish and game problems and also discussions and resolutions. Many of the technical game papers are listed individually in this issue of WR. Many other papers in the volume pertain to administrative problems. The following topics are dealt with in groups of papers: the Soil Bank and how it can be made to do more for wildlife, pros and cons of Flyway Councils as the answer to waterfowl problems, whether or not western wildlife can survive today's demands, problems of water rights and river development, conservation education techniques and their results, trends and problems in law enforcement, and status of national conservation legislation. There are also 6 technical fisheries papers. A decided improvement in volumes of this series would be provision of concise, informative summaries for all technical papers.

Stokes, Allen W. (Utah State U., Logan.) GAME STOCKING--A REALISTIC MANAGEMENT TOOL? 47th Conv. Internatl. Assn. Game, Fish & Cons. Comms. p. 135-140. 1957.

A technical analysis. Conclusion: "What then is the role of stocking in game management? Stocking [in or just before shooting season] produces more birds in the bag than we thought 10 years ago. It could be made more economical by better stocking methods and by utilizing hens. [Stokes urges more general shooting of hen pheasants.] But it is still a bankrupt program. If its objective is to maintain hunting success, it will become staggeringly more expensive in the face of declining habitat and increasing hunters. If its goal is preserving a semblance of public hunting on public shooting grounds, it will degenerate into a state-operated shooting preserve that might better be turned over to commercial groups. Better results will come from longer hunting seasons and utilizing our presently wasted resource--the hen pheasant. But the most fruitful plan, although the most difficult to practice, lies in creating incentive for the landowner to manage his land for wildlife as well as agricultural crops." Examples are given of how landowners can do this with important amounts of profit. Extension advice from game departments is highly desirable.

Strawn, Wm. H. A MANAGEMENT PLAN FOR THE SHAVER CREEK BLOCK OF THE STONE VALLEY EXPERIMENTAL FOREST. M. S. thesis, Pa. State U. 1954.--P. F. English.

## WILDLIFE--HUNTING AREAS & PROBLEMS

Dickey, Charley. (RD 2, Box 408, Greenwood, S. C.) SHOOTING PRESERVES IN THE UNITED STATES. Trans. 22nd N. Am. Wildl. Conf. p. 396-402. 1957.

"Shooting preserves are privately owned and operated areas where pen-raised game is released for hunting, usually upon payment of a fee by the shooters." More than half of the states have shooting preserves. Pheasants are the most popular species. Ideal preserve legislation includes a maximum acreage, a minimum acreage, a minimum seasonal release of each species and a maximum percentage of allowable recovery of each species. Preserve regulations have been kept simple in most states; there is no need for complicated laws. States should clarify their regulations concerning the U. S. Fish and Wildlife Service administrative ruling that mallard and black ducks, more than two generations removed from the wild, can be taken without regard to bag or season limits. State game commissions should provide current listings of shooting preserves open to the public to help sportsmen find places to hunt. With the years of successful preserve operation in so many states, and with the experience these states have gained and are willing to pass on, it is easy for every state to make it possible for hunters to enjoy shooting preserves.--Author.

Dickey, Charles. (RD 2, Box 408, Greenwood, S. C.) FLIGHTING MALLARDS ON SHOOTING PRESERVES. Modern Game Breeding 28(2): 8-13, 6 figs. Feb. 1958.

Much helpful information on how to set up a commercial mallard-shooting establishment: regulations, selection of area to avoid legal problems about wild birds, layout of grounds for good flights.

Gearhart, Dick. "FRONTIERS" FORMED TO HELP SOLVE OLD HUNTER-OWNER FEUD. N. M. Wildl. 2(12): 7. Dec. 1957.

"Frontiers," a non-profit corporation has been organized at Portland, and expects to operate in various states. The plan is to sign up landowners and have their lands posted for hunting only by Frontiers' members. Landowners will then be insured against loss or damage caused by recreational use of their land. Hunting members will pay a fee, tentatively set at $7.50, to cover any necessary payments to landowners. The plan is to be tested in Ore. and Calif. in 1958. A hunting member will have rights in any area and state in which Frontiers operates.

Gordinier, Earl J. (Mich. Dept. Cons., Lansing.) YIELD AND PUBLIC USE OF MICHIGAN STATE GAME AREAS. Trans. 22nd N. Am. Wildl. Conf. p. 404-411, graph. 1957.

Studies of game yield and public use were made in 41 s. Mich. state game areas having a total of more than 130,000 acres. Surveys were carried out according to stratified random sampling plans. Use was measured by car counts, and yield by mail survey. Private land use and yield data were obtained from records kept by landowners. Hunting pressure on upland game areas av. 183 hours per 100 acres. This was 3 times greater than hunting pressure on private land. Waterfowl areas produced far more hunting per unit area than upland areas. Hunting pressure on 9 waterfowl areas av. 1,778 hours per 100 acres, nearly 10 times greater than that of upland areas. The small game yield was 18 units per 100 acres on upland game areas; 12 units per 100 acres on private land. The 41 state areas offer 1 to 2 million hours of non-hunting recreational use in addition to more than a half million hours of hunting annually. They represent more than 130,000 acres of sub-marginal land put to good use. They demonstrate conservation in practice on the land, and serve as laboratories for game management practices. About 6.5% of s. Mich. hunting is done on game areas. They are an important aid in supplying hunting space for increasing numbers of hunters.--Author.

Hunter, Gilbert N. (Colo. Game Dept., Denver.) THE TECHNIQUES USED IN COLORADO TO OBTAIN HUNTER DISTRIBUTION. Trans. 22nd N. Am. Wildl. Conf. p. 584-593, 2 maps. 1957.

From author's summary: "To obtain proper hunter distribution, it is necessary that a Game and Fish Commission, through its Director, have adequate authority for effective administration and management [which]...should include the authority to establish season lengths and dates, bag limits, shorten or extend, or close seasons on any species of fish and game within a 48-hour period, designate the sex, species and the number to be taken, the manner, and have the right to open or close refuges to hunting... The Colorado 1956 deer season...resulted in the greatest deer harvest in the State's history." Many of the effective methods employed in Colo. are described and analysed.

## WILDLIFE--INTRODUCTIONS

Glazener, W. C., and Clarence Cottam. (Welder Wildl. Found., Sinton, Texas.) EXOTICS. Texas Game & Fish 16(1): 4-7, 2 figs. Jan. 1958.

"Perhaps in no line of game and wildlife management have our people and even state administrators of the past proceeded more blindly, with less factual information and, with few exceptions, with less success than in exotic introductions." This paper reviews many introductions into the U. S., especially into Texas, and some of their results. It is much shorter than Cottam's 1956 paper (46th Conv. Internatl. Assn. Game, Fish & Cons. Comms., p. 94-111) but the recommendations are similar to those of that paper as reported in WR 87:23.

Presnall, Clifford C. (US F&WS, Wash., D. C.) THE PRESENT STATUS OF EXOTIC MAMMALS IN THE UNITED STATES. J. Wildl. Mgt. 22(1): 45-50. Jan. 1958.

Inquiries sent to all state game departments and many independent authorities during April 1957 revealed 15 exotic mammalian spp. (exclusive of feral livestock and commensal rodents) now maintaining themselves in the wild in the U. S. They resulted from not less than 63 introductions made between 1650 and 1950. Results of importations have been largely negative or inconclusive. Present status of

each sp. is discussed. Partially or locally successful introductions include Lepus europaeus, Sus scrofa, Ammotragus lervia, Dama dama, and Boselaphus tragocamelus. Myocastor coypus seems to be too successful in s. coastal areas and is becoming a pest. Other importations, chiefly inconclusive, are: Vulpes vulpes; Oryctolagus cuniculus; Antilope cervicapra; Ovis musimon; Cervus elaphus; Cervus nippon; Cervus unicolor; Axis axis; and Axis porcinus.--Author.

## WILDLIFE--ECONOMIC & OTHER VALUES

Bond, C. H. (Okla. Dept. Wildl. Cons.) AN ECONOMIC STUDY OF OKLAHOMA DEER. Okla. Wildl. 13(12): 18-19, 1 photo. Dec. 1957.

In 1953, 21,254 Okla. deer hunters spent an av. of $56.61 each for an estimated total of $1,203,189. In 1955 and 1956, when there were about 22,500 and 24,000 hunters, the av. hunter spent $59.28. Breakdown of these costs is given. These figures demonstrate that it is to the financial advantage of Oklahomans to discourage poachers and free-running dogs. The state could carry populations of both whitetail and mule deer several times as large as present ones. A change of public attitude is needed.

Texas. A SURVEY OF HUNTING AND FISHING IN TEXAS. Texas Game & Fish Comm. 4 p. folder, 3 graphs. [1957.]

Based on work by Crossley, S-D Surveys. Pertains to 1955. One out of 4 Texans over age of 12 hunted or fished. They spent $165 million--$123 million on fishing, $42 million on hunting. They spent an av. of $101.57 each. Amount spent on hunting and fishing was greater than that spent on medical and dental care and hospitalization insurance combined. It was more than twice as great as amount spent on admissions to sporting events and theaters. Nevertheless, hunting and fishing expenditures were below national av. Hunters were afield an av. of 13 man-days on 11 trips and av. 666 mi. of travel. Costs to hunters were 45% for equipment, 35% for travel, and only 4.5% for licenses.

## WILDLIFE--FOOD HABITS & TECHNIQUES

Adams, Lowell. (Susanville Res. Center, Susanville, Calif.) A WAY TO ANALYZE HERBIVORE FOOD HABITS BY FECAL EXAMINATION. Trans. 22nd N. Am. Wildl. Conf. p. 152-158, 3 figs. 1957.

A test of the applicability to herbivores of the Scott method of food-habits analysis. The method entails test feedings and fecal analysis to calibrate fecal content to amounts and kinds of food eaten. A proposed refinement of the technic is to use certain recognition items to represent each food-species. Instead of sorting all the fecal material, only recognition items are tallied. Numbers of recognition items in feces are calibrated against weight of food eaten for each species of plant in the diet. This gives a factor by which the number of recognition items in field-collected samples of feces can be converted to weights of each forage species eaten. A test of the calibration phase of the technic was made with snowshoe hares as test animals. Preliminary results gave conversion factors of 0.046 for Ore. grape and 0.031 for Douglas-fir. The factor for Ore. grape varied considerably, probably as a result of different selections of plant parts in the different trial meals. This variability probably could be controlled by using different recognition items for different parts of the plant. The calibrations proposed by Scott appear to be feasible for herbivores. --Author.

Cunningham, Frank E. (US For. Serv., Williamstown, Mass.) A SEED KEY FOR FIVE NORTHEASTERN BIRCHES. J. For. 55(11): 844-845, 5 photos. Nov. 1957.

## WILDLIFE--PREDATION, CROP DAMAGE, CONTROL

Besser, Jerome F. (US F&WS, Denver 2, Colo.) EFFECTIVENESS OF REPELLENT TREATMENTS FOR PROTECTION OF TREES FROM ANIMAL DAMAGE (1956-57). US F&WS, Wildl. Res. Lab. (Denver 2, Colo.), Spec. Rep. 19 p., mimeo. [1957.]

Report of tests made by cooperators in 9 states and B. C. Repellents tested were ZAC, TMTD, TN-2500, Diamond L Brand Deer Repellent, Ringwood Repellent,

CRAG Experimental Fungicide 5400. They were tried against various kinds of deer, rabbits, hares, and to a limited extent against goats and cattle. Results are tabulated and discussed. Information on suitable adhesives, methods of application, and suppliers of repellents is given. Applications often were highly successful, but results cannot be summarized here owing to wide variations reported. These variations were correlated not only with type and concentration of repellent, but with locality, species of plant, species of animal, and other factors. This progress report does not include recommendations.

Davis, David E. (Johns Hopkins Sch. Hygiene, Balt. 5, Md.) THE USE OF FOOD AS A BUFFER IN A PREDATOR-PREY SYSTEM. J. Mamm. 38(4): 466-472, 1 fig. Nov. 1957.

Summary: "To explore the role of a buffer in a predator-prey system a test of the use of cat food was organized. Cats on a farm were increased in number and given cat food for two 2-month periods alternated with non-feeding periods. The rat population was compared with the data from three previous years. The rat population declined in the fall (cats being fed) earlier than in previous years. In the spring the rat population did not increase (cats being fed) in March and April as usual. In May the rat population increased when the cats turned to squabs for food. Examination of cat feces showed that rat hairs were present in about the same number in the periods when the cats were fed as when they were not fed." "A buffer should be readily available at a time of scarcity of the main prey so that the predator population can be kept high... The essence of biological control...is to maintain a high predator population when the prey is scarce." Suggestions are given for increasing the predation of farm cats on rats.

Symposium. WILDLIFE REPELLENTS / MINUTES OF THE MEETING ON WILDLIFE REPELLENTS AT ARNHEM (NETHERLANDS) ON 3RD AND 4TH OCTOBER 1955. Instituut voor Toegepast Biologisch Onderzoek in de Natuur, (Kemperbergerweg 11, Arnhem, Netherlands) Mededeling no. 32. 1-83 p. 1957. Price $1.00 (U. S.), paper.

Not particularly on repellents, but on crop damage and its control by various means. Contains 1 long paper and 3 short ones: (1) Damage to crops by birds and mammals, and methods for the prevention of such damage, by E. van Koersveld, p. 9-71. Tables of damage done by birds and mammals, by species, period of year, and region, occupy p. 11-38. The tables are followed by general discussion of the cost of damage, methods of assessing damage, and methods of preventing damage--including chemical and acoustical repellents and poisons. A number of specific recommendations are included here. More recommendations follow in a section devoted to damage caused by individual bird and mammal species and prevention of this damage. (2) Recherches acoustiques sur les corbeaux, by J. Giban, p. 72-76. (3) Myxomatosis in the United Kingdom, by Harry V. Thompson, p. 77-78. Brief statement on origin and spread of the disease in England, and favorable effects on crops in 1955. The buzzard feeds young rabbits to its nestlings; over much of its range in Britain it failed to breed in 1955. The breeding of tawny owls was also affected by a shortage of wood mice and field voles, which had been eaten by foxes. (4) Wildabwehrmittel, by F. A. Steensma, p. 79-83. Outline of the repellent research program of the Instituut.

## WILDLIFE--REPORTS OF ORGANIZATIONS & REPORTS OF HARVESTS

Alberta. ANNUAL REPORT OF THE DEPARTMENT OF LANDS AND FORESTS...FOR THE FISCAL YEAR ENDED MARCH 31ST 1957. Queen's Printer, Edmonton. 98 p., illus. 1957.

The Report of the Fish and Game Administration, p. 48-59, reviews conditions and activities; includes tabulation of wild fur take, by species, number, and value; and gives tabulation, for major species, of estimated numbers of game birds shot in each of the 4 years, 1953-56.

Colorado. DEPARTMENT OF GAME AND FISH, ANNUAL REPORT, FISCAL YEAR 1956-57. 1-48 p., illus. 1957.

Good review of activities and policies. One useful table, p. 5, shows expenditures made by sportsmen for different types of hunting and fishing. Total for hunting was $25,620,633. Total for fishing was $51,391,066. About 40% represents costs of clothing and equipment, while 60% represents costs of food,

lodging, travel, etc. One section of the publication discusses the status of various types of game animals. Tables show bear kill, 1948-56; fur take, by species, 1953-57; and pumas bountied, 1945-57. Puma bounty is $50, is opposed by game department. Number of pumas bountied each year has risen rapidly, chiefly because of more interest in puma hunting as a sport.

Leffler, Ross L. (US F&WS, Wash., D. C.) PLANNING FOR THE NEXT TEN YEARS. Trans. 22nd N. Am. Wildl. Conf. p. 74-81. 1957.
A discussion of the organization of the Fish and Wildlife Service under the Act of 1956, Public Law 1024. General plans, organization, and objectives are considered. Research needs are emphasized, as is the plan for a full partnership effort with the states and with private conservation agencies.

Maryland. FORTIETH ANNUAL REPORT OF THE DIRECTOR AND NINETEENTH ANNUAL REPORT OF THE GAME AND INLAND FISH COMMISSION, 1957. Md. Cons. 34(6): 1-32, illus. Nov. 1957.
General account of activities. Includes figures on game animals released, deer bagged, and lands managed.

North Dakota. A SUMMARY OF ACTIVITIES IN 1957. N. Dak. Outdoors 20(7): 1-20, illus. Jan. 1958.
Annual report of semi-popular type. Includes figures on kills and status of deer, antelope, waterfowl, pheasants (exceptionally good year), and sharp-tailed grouse. Fur catch is tabulated by species and value. The fur resource has an estimated capital value of $19,000,000. Data are given on habitat improvements made on public and private lands.

Oregon. 1957 ANNUAL REPORT / OREGON STATE GAME COMMISSION / GAME DIVISION. vi + 176 p., illus. [1957.]
A valuable statistical source book of freshly gathered data on all sorts of Ore. game. Given in detail and with numerous tables, are facts and figures on status, production, population trends, kills, sex ratios, hunting statistics, and damage control. Takes of fur animals and predators are reported. Projects of the Coop. Wildl. Res. Unit are summarized at length. Management work done on various areas is reported. In general, production of game was below av. in 1956, but excellent growing conditions throughout the state caused wide habitat improvement. Waterfowl populations declined and waterfowl hunters were fewer. General hunting pressure did not increase substantially in 1956.

U. S. Dept. Interior. 1957 ANNUAL REPORT, SECRETARY OF THE INTERIOR FRED A. SEATON FOR THE FISCAL YEAR ENDED JUNE 30, 1957. Govt. Printing Office, Washington. xxxviii + 435 p., 38 figs. [Jan. 1958.] $1.50, paper, from Supt. Documents.
This volume includes reports of Fish & Wildlife Service, National Park Service, Geological Survey, and bureaus of Reclamation, Mines, Indian Affairs, Land Management, and other agencies. It is illuminating in showing the vast span of important activities in the Department and is worth scanning if for no other reason. It also mentions numerous accomplishments of the period and serves as some guide to current trends and thinking. In general, however, the range of activities in the Department is so wide that only highlights can be mentioned. Details of programs and plans must be sought elsewhere.

## WETLANDS & WILDLIFE

Anon. PROPAGATION OF WILD DUCK FOODS. US F&WS, Branch Wildl. Refuges, Wildl. Mgt. Ser., Leafl. no. 1 (Revised). 23 p., mimeo. Apr. 1949.
Much good information on planting and handling a wide variety of duck-food plants.

Anon. DEVELOPMENT AND MANAGEMENT OF DIKE COVER. US F&WS, Branch Wildl. Refuges, Wildl. Mgt. Ser., Leafl. no. 1A. 29 p., 1 map, mimeo. Apr. 1950.
Includes information on planting and handling many species of plants on a wide variety of dikes.

Appel, J. C. (W. Va. Cons. Comm.) WATERFOWL DEVELOPMENT, McCLINTIC WILDLIFE STATION, POINT PLEASANT, WEST VIRGINIA, 1953 TO JUNE 30, 1957. Redstart 24(4): 70-77, 3 maps. Sept. 1957 [Jan. 1958].

Excellent performance at practically no cost is exceedingly good news in this day when many development projects necessarily run into 5 or 6 figures. W. Va. got 2500 acres of a TNT plant from U. S. after World War II. The area is used as a wildlife experiment station and for many recreational purposes. Upland game work is under PR but marsh work is financed mainly by state. Marsh development has cost less than $7,000. Some 40 marshes totaling over 160 acres have been made. Terrain features such as old roads have been used. Dams have been kept as simple as possible. One 12-acre marsh cost $50. It has reared over 400 ducklings. Use of area by migrant waterfowl has increased from 200 to 5,000. Wood ducks have increased from 1 brood to 47 broods despite little use of nest boxes. Mallard colony started in 1954 produced 100 young in 1956. Canada geese introduced in 1954 produced 3 broods in 1957. Aquatic plants introduced have not done well and most reliance is placed on natives. Muskrats are used to control vegetation and are themselves cropped at a profit. Marshes are also used for fishing, which is seasonally curtailed to favor waterfowl breeding. Dabbling and diving ducks are trapped for banding; techniques evolved for both groups are described here. Results of banding 3,721 ducks are mapped for mallard, black, and wood ducks.

Barstow, C. J. (Tenn. Game Comm.) A COMPARATIVE STUDY OF AVAILABILITY OF WATERFOWL FOODS AND WATERFOWL USE ON A SERIES OF CLEAR AND TURBID FARM PONDS IN NORTH CENTRAL OKLAHOMA. Presented at 11th Ann. Conf. SE. Assn. Game & Fish Comms. 12 p., 5 figs., proc. Oct. 1957.

From author's abstract: 21 clear and 23 turbid ponds in Payne and Noble counties were studied Feb.-May 1956. 5,402 waterfowl of 13 spp. were observed, 84.6% of them dabblers. Waterfowl numbers reached peak in first week of March and then declined sharply. This decline coincided with depletion of aquatic plants under waterfowl use. Clear ponds received 95.9% more waterfowl usage than did turbid ponds. Amount of use by waterfowl did not seem to be affected by "type" of pond--i.e., whether open or ravine. Direct disturbance by man's activities seemed to have little effect on use of a pond by ducks. "Creating and maintaining clear and productive farm ponds seems to be the most feasible and economical waterfowl management practice in this area."

Choudhuri, H. C. (State Agr. Res. Inst., Calcutta.) "MERCENE SPECIAL" AS ERADICATOR OF WATER-HYACINTH. Sci. & Culture 22(1): 49-51, illus. 1956. [From Biol. Abs. 32(1).]

These weedicides are alkaline aqueous solutions of arsenic salt. Water-hyacinth was successfully killed in 14 days when sprayed with solutions of Mercene Special and Mercene Special-A. These proved more highly selective than 2,4-D and Methoxone and they killed only water-hyacinths even though other weeds were present with them.

Cook, Arthur H. (16 Turkey Hill Rd., Ithaca, N. Y.) WATERFOWL MARSHES AND MENUS. N. Y. State Cons. 12(4): 16-18, 40, 6 figs. Feb.-Mar. 1958.

Something is decidedly wrong when a shallow-water marsh doesn't produce abundant vegetation. The trouble is likely to be too much soluble iron and manganese. Marsh soils usually have high levels of plant nutrients--and amounts of these nutrients seem to increase with duration of flooding. Yet our new marshes often deteriorate with time. Explanation is likely to be iron and manganese becoming soluble because of mild acidity and too little oxygen. Drainage of marsh and aeration of soil is needed, coupled with liming to produce pH of 7.5 to 8.0. This paper also discusses what is known of habitat requirements of Potamogeton, Polygonum lapathifolium, wild rice, and Scirpus. Methods of propagating these are summarized.

Darden, Wm. M., and David R. Talbott. A NEW MECHANICAL TECHNIQUE FOR CONTROLLING AQUATIC VEGETATION. Proc. 12th Ann. Meeting NE. Weed Control Conf. p. 344-345. Jan. 1958.

General information about new machine but no source of further information, not even authors' address. The machine, however, is said to be wonderful. It operates by uprooting aquatic plants by loosening bottom with batteries of water jets. An attachment catches the plants so they can be disposed of. Machine can be used on rowboat, barge, or truck.

Day, Albert M. (Ore. Fish Comm., 307 State Off. Bldg., Portland 1.) DRAINAGE IN RELATION TO SOIL BANK PROGRAM. 47th Conv. Internatl. Assn. Game, Fish & Cons. Comm. p. 102-107. 1957.

Drainage is proceeding so rapidly in the U. S. that in 25 years we will have little waterfowl nesting territory left. Some people think that ducks will then simply move northward to nest in arctic and subarctic areas. This is an idle hope, for these areas are not suitable for many more ducks. Wildlife workers had hoped that soil bank provisions would result in saving or creating waterfowl breeding grounds. Unfortunately, almost nothing has been accomplished in this respect despite some favorable action on federal and state levels. Author discusses this situation thoroughly and shows that the trouble is that policy is determined by local people at the local level. These people want drainage and drainage is proceeding rapidly even in states where the greatest efforts have been made to retard it.

Decker, Eugene. THE CONNEAUT MARSH--MARSH AND WATERFOWL INVESTIGATIONS. M. S. thesis, Pa. State U. 1955.--P. F. English.

Edelman, C. H., and J. M. van Staveren. MARSH SOILS IN THE UNITED STATES AND IN THE NETHERLANDS. J. Soil & Water Cons. 13(1): 4-17, 6 figs. Jan. 1958.

Important paper on properties and reclamation potentials of soils of coastal marshes in U. S. Should be of value to refuge planners and others concerned with marsh use and conversion. The authors, Dutch experts on soils and water management, toured Atlantic and Gulf coastal marshes with U. S. experts. This is their report. In it they discuss the chemical, physical, and hydraulic characteristics of various marsh soils and tell how they might be utilized best, which lend themselves best to reclamation, and how the different types could be handled. They do not presume to say just what should be done with each type under present economic conditions, but they do imply that in the long run only the poorest type, "cat clay," should be considered as best devoted to wildlife use. [In other words, as economic pressures increase, we can expect to see most of our coastal marshes converted to crop fields and pastures. If we want to save marshes for wildlife, we must get them designated for that purpose while there is still some chance.]

Errington, Paul L. (Iowa State Coll., Ames.) OF MEN AND MARSHES. Macmillan, 60 Fifth Ave., N. Y. 11, N. Y. ix + 150 p., 22 drawings. 1957. $4.50, cloth.

Marshland life--teeming, changing, growing, dying--from spring through winter is the theme of the first part of this book of ecological philosophy. Realism of detail and events come from the author's lifelong love of marshes and marsh dwellers. Particulars concerning muskrats, minks, and marshes are particularly well drawn, and are based on years of intensive study. The story of the seasons in the north-central marshes is followed by notes on other marshes, those of desert and mountain and the South. One chapter is devoted to marsh islands. The second portion of the book deals with men and marshes. One chapter tells how a person can get along in a marsh with a minimum of discomfort. Others discuss philosophy and practicalities of marsh use and conservation of marshland. The final chapter is a discussion of biological laws affecting muskrat communities and their human parallels. "Of Men and Marshes" is of particular interest as an expression of feelings and beliefs of an outstanding biologist and conservationist who knows marsh biology as few have ever known it. The book is illustrated by vivid black and white drawings by H. A. Hochbaum, but has no index and no references.--L. F. Stickel.

Givens, Lawrence S., and Thomas Z. Atkeson. (US F&WS, Peachtree-7th Bldg., Atlanta 23, Ga.) FARMING FOR WATERFOWL IN THE SOUTHEASTERN UNITED STATES. US F&WS, Atlanta, Ga. 1-30 p., proc. Dec. 1956.

Probably the most useful paper of its type. Ten pages of tables show how to manage 33 different crops for waterfowl use. Text discussion outlines special techniques and suitable crops for uplands, dewatered land, low land, shoreline, and mud flats. Special problems considered include local food preferences, goose flock establishment, legal problems, problems with crows or other unwanted species, and research needs.--L. F. Stickel.

Givens, Lawrence S., and Thomas Z. Atkeson. (US F&WS, Atlanta, Ga.) THE USE OF DEWATERED LAND IN SOUTHEASTERN WATERFOWL MANAGEMENT. J. Wildl. Mgt. 21 (4): 465-467. Oct. 1957.

Use of dewatered land is assuming increasing importance in production of waterfowl foods. Management of green timber reservoirs, open dewatered areas, and methods and crops used are discussed upon basis of observations on FWS, state, and private areas. Farming is the most reliable method of producing large quantities of preferred waterfowl foods. Green timber reservoirs provide a cheap and easy means of attracting waterfowl, especially mallards and wood ducks.--Authors.

Griffith, Richard E. (US F&WS, Wash., D. C.) MANAGEMENT OF WATERFOWL HABITAT ON THE NATIONAL WILDLIFE REFUGES. Trans. 22nd N. Am. Wildl. Conf. p. 215-220. 1957.

Outlines purposes and problems. Water level manipulation is a useful tool, but brings with it the problem of algae control, which requires basic research. Management for production is a special problem involving many factors such as control of human disturbance, proper management of grazing, provision of nesting islands, and plant control.

Gromme, Owen J. (Milwaukee Public Mus., Wis.) AN OPEN REPORT ON THE CURRENT STATUS OF HORICON MARSH AS A WATERFOWL REFUGE. Passenger Pigeon 19(3): 99-106, 2 photos. Autumn 1957.

Attacks draw-down policy being followed on federal part of Horicon. "It is our firm conclusion that under the present physical circumstances and lack of adequate water control, the extent of redrainage of Horicon Marsh is ill advised and catastrophic, and that the temporary gain is far outweighed by the loss of nesting waterfowl and worsened public relations."

Gunter, Gordon. (Gulf Coast Res. Lab., Ocean Springs, Miss.) WILDLIFE AND FLOOD CONTROL IN THE MISSISSIPPI VALLEY. Trans. 22nd N. Am. Wildl. Conf. p. 189-195. 1957.

The Miss. R. floodplain consists of large basins, 35,000 sq. mi. in extent, lying between natural levees and escarpments of the valley. There are now 300 reservoirs on the watershed. The total effect of reservoirs on wildlife and aquatic life has been good. The general establishment of better hydraulics for the river has tended to lower high water stages. In contrast, the levee system has cut the river off from natural overflow areas, caused higher water stages, and destroyed the swamp habitat in the lower river. If levees were set back from the river in thinly populated areas, transient reservoirs would be created. These would lower flood heights, create habitat for wildlife and nursery grounds for aquatic organisms, permit the lowlands to be aggraded by silt, and recharge the ground waters. Controlled flow through the closed-off distributaries of the lower river would also have some similar effects and would benefit the estuarine area around the river mouth. The conservation of some of the water and land now wasted into the sea, plus the creation of aquatic and wildlife habitats and possible lowering of levee heights, are potential benefits of such a program which make it worthy of serious study in all of its sociological, economic, engineering, and biological aspects.--Author.

Hardcastle, W. S. (La. Wildl. Comm., Baton Rouge.) A RAPID LABORATORY METHOD OF SCREENING HERBICIDES AGAINST AQUATIC PLANTS. Weeds 6(1): 64-65. Jan. 1958.

Tells how to plant cuttings in 1 qt. fruit jars filled with soil and water and how to apply the herbicidal solutions to the jars.

Harger, Elsworth M. CONTROL OF SEDGE AND LEATHERLEAF ON FLOODING PROJECTS WITH HERBICIDES. Mich. Dept. Cons., Game Div., Report no. 2155. 2 p. Dec. 1957.

Results of experiments. Discussion: "The open nature of both leatherleaf [Chamaedaphne] and sedge [Carex and Scirpus] sites makes them easily marked for flying. The pilot can work very closely, producing accurate work with minimum drift. Aerial application of Dalapon can effectively control sedge. Our work indicates that 15 pounds per acre is satisfactory. Mowing is not necessary but spraying should precede flooding in sedge management. A heavy dose of 5 quarts of 2,4,-D in 5 gallons of water per acre will kill leatherleaf. However, the stubble still remains. We suggest a follow-up burn to eliminate this stubble and possibly expose soil to allow duck foods to volunteer following flooding. Inundation within a year will maintain the openings created and speed the volunteering of duck foods."

Ingram, Wm. Marcus. HANDBOOK OF SELECTED BIOLOGICAL REFERENCES ON WATER POLLUTION, CONTROL, SEWAGE TREATMENT, WATER TREATMENT. US Dept. Health, Ed., & Welfare, Pub. Health Serv. Publ. no. 214; Publ. Health Bibliog. Ser. no. 8. x + 95 p., 6 pl. Revised 1957. 45¢ from Supt. Documents.

References are listed under 4 main subjects: pollution in general, sewage treatment, water treatment, and identification of organisms that are important in problems of water quality. Includes a number of obscure references on poisonous algae. On the whole, however, this list of references is designed mainly for those concerned with operation of sewage and water-treatment plants.

MacNamara, L. G. (N. J. Div. Game.) POTENTIALS OF SMALL WATERFOWL AREAS. Trans. 22nd N. Am. Wildl. Conf. p. 92-96. 1957.

Construction, development and management of small waterfowl areas offer practical opportunity to maintain and extend habitat. These areas have their own problems. There are now indications that they reach maximum production in their 3rd or 4th year. Some workers believe that drawdown is not always a suitable management measure, and that constant water levels are sometimes more favorable to production. Small refuge areas may sometimes interfere with hunting and inhibit proper dispersion of waterfowl. The author believes the management areas can be an adjunct to production, are a possible factor in better distribution of birds in the flyway, and have possibilities in improving opportunities for hunting.

Martin, Alex C., Ray C. Erickson, and John H. Steenis. IMPROVING DUCK MARSHES BY WEED CONTROL. US F&WS, Cir. 19-Revised. iv + 60 p., illus. 1957 [1958]. 25¢ from Supt. Documents.

Although termed a revision, this is virtually a new work based on much new research and the publications of others. It is a guide to the control of 17 kinds of floating or emergent marsh herbs and several kinds of wetland woody plants. The discussion of a given species includes facts about distribution, mode of reproduction, importance, control by various means and on different sites, and references. Material is as specific and up-to-date as possible and is presented practically and concisely. Introductory sections consider the importance of prevention and early action, proper timing of control measures for best kill, control by manipulation of water levels, control with herbicides, mechanical control, and burning. One section offers helpful aids in mixing herbicidal preparations of desired strengths.

Michael, Haskell T. (Soil Cons. Serv., Anahuac, Texas.) EXTRA PROFITS FROM WILDLIFE. Soil Cons. 23(9): 190-192, 2 photos. Apr. 1958.

How cattlemen and rice growers of coastal Texas are making money selling hunting rights. Some gross $10 to $25 per acre a year. Ducks and geese are the chief attraction, but fishing and trapping also add to income. Money from sportsmen is not clear profit, for many landowners practice special management, including control of water levels. Certain owners arrange to have sportsmen's clubs install water-control structures and cattle walkways into the marsh.

Pierce, Madelene E. (Vassar Coll., Poughkeepsie, N. Y.) THE EFFECT OF THE WEEDICIDE KURON UPON THE FLORA AND FAUNA OF TWO EXPERIMENTAL AREAS OF LONG POND, DUTCHESS COUNTY, N. Y. Proc. 12th Ann. Meeting NE. Weed Control Conf. p. 338-343, mimeo. Jan. 1958.

The pond is shallow and 1 mi. long. Two plots, each 50 x 100 ft., were treated with Kuron [2-(2,4,5, trichlorophenoxy) propionic acid] at rate of 1.5 gal. Kuron per surface acre. Chemistry, plants, and animals of the pond were studied. Sprayed pickerel weed was completely killed. White water lily was killed back but began to resprout by end of season. Submerged plants did not appear even weakened. No damage seemed to be done to any planktonic or benthic organisms or to any vertebrate or invertebrate animals.

Shaeffer, J. H. (Parker, S. Dak.) DEPARTMENT OF AGRICULTURE SUBSIDIES ARE SCUTTLING WATERFOWL. Trans. 22nd N. Am. Wildl. Conf. p. 84-91. 1957.

Findings of the North and South Dakota Emergency Conservation Committee concerning drainage subsidies: "1. Because of improper timing, drainage subsidies appeared to have little, if any, value in helping to sustain the war effort. 2. Drainage subsidies continue to contribute to present-day surplus problems. 3. Drainage subsidies have resulted in the effective obliteration of

over 1,000,000 acres of nationally important waterfowl breeding habitat in North and South Dakota and Minnesota, and, if continued according to Department of Agriculture plans, will soon destroy the remaining wetlands. 4. The committee was unable to ascertain any logical reason for continuation of drainage subsidies in the prairie pothole region." Potential value of the Soil Bank program in wetlands restoration was found by the committee to be unfulfilled; instead, these portions of the program were not implemented, and drainage was continued.

Sincock, John L., and James A. Powell. (Box 405, Sebastian, Fla.) AN ECOLOGICAL STUDY OF WATERFOWL AREAS IN CENTRAL FLORIDA. Trans. 22nd N. Am. Wildl. Conf. p. 220-235, 6 figs. 1957.

Because of extensive changes proposed in the hydrology of vast areas in s. and central Fla., a vegetation study designed to determine the effect of these changes on waterfowl habitat was initiated during summer of 1956. The hypothesis of the study was that duration of imundation was one of the primary factors in determining distribution and frequency of marsh vegetation. Using a 5-point transect method, 56,118 points were recorded on 32 mi. of transect in less than 3 months time. Frequencies of species of vegetation were defined by 6-in. contours in a 9-ft. range. An IBM "mark sense" system was used in field recording; it expedited recording and analysis. A method of predicting changes in distribution of species of vegetation with changing hydrology is discussed. Duration-of-imundation tolerances of a few common species of marsh vegetation are presented.--J. L. Sincock.

Wanie, B. A., and C. W. Threinen. (Wis. Cons. Dept.) KEEPING HORICON MARSH HEALTHY. Wis. Cons. Bul. 23(1): 18-20, 2 figs. Jan. 1958.

Carp would ruin Horicon Marsh, Wis. and must be kept under control. Usual means do not work. But hundreds of thousands of lbs. of carp are removed annually from 5 fence-type traps. Ordinarily, these traps would not be satisfactory for carp, but they are situated in channels carp must use in getting to streams and ditches when marsh water becomes low in oxygen.

Younger, Roy R. (N. J. Div. Game.) PRELIMINARY STUDIES USING KURON AS AN AQUATIC HERBICIDE. Proc. 12th Ann. Meeting NE. Weed Control Conf. p. 332-337, mimeo. Jan. 1958.

Kuron seems to be an unusually promising aquatic herbicide. It gave good control of most kinds of submerged plants in 13 lakes and ponds in N. J. but did not affect emergents or trees. Concentration effective was 2 ppm. Total destruction of plants took about 21 days. No algal blooms appeared after treatment; the chemical may be algicidal. Data indicate no serious oxygen lag. Potamogeton and Lemna minor were not effectively controlled.

## FARMLAND & WILDLIFE

Borell, A. E. (Soil Cons. Serv., 321 New Custom House, Denver 2, Colo.) HOW TO GET MORE WILDLIFE PRACTICES ON CONSERVATION RESERVE LANDS. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 26-29. 1957.

Eiche, Carl. WILDLIFE'S WILLING WORKERS. Mo. Cons. 19(2): 12-13, 2 photos. Feb. 1958.

Another way to get wildlife developments on the land. An adult group called "Willing Workers for Wildlife" raises money through sports show and otherwise and uses it to pay 4-H groups to put cover around ponds, plant multiflora, put in food patches, provide nesting areas, etc. In addition to concrete benefits, educational and public relations values have been significant.

Evans, Thomas R. (Ill. Dept. Cons.) ANALYSIS OF NEEDS TO MAKE THE SOIL BANK PROGRAM EFFECTIVE FOR FISH AND WILDLIFE. 47th Conv. Internatl. Assn. Game, Fish & Cons. Comms. p. 97-102. 1957.

Presents much information on how soil bank regulations have been altered by Agriculture to make them more favorable to wildlife, on a variety of further changes that are needed, and on what the states can do to take better advantage of the great potential of the soil bank. Includes quantitative data on nesting success of pheasant in mowed and unmowed hayfields to illustrate importance of the commonly overlooked Acreage Reserve.

Karpen, George. (N. Dak. Game Dept.) CONIFERS AND COVER. N. Dak. Outdoors 20(5): 8-10, 7 photos. Nov. 1957.

Wildlife plantings in N. Dak. must stop snow and provide good cover. A standard arrangement is to plant 2 rows on n. or w. side to a dense shrub such as Caragana, and then 6-8 rows of tall open trees into which snow will drop. The other 8-10 rows are of low, bushy plants that provide food and cover. Here conifers are highly effective. Junipers are the most generally useful. Spruce are good but less tolerant of drought; they are more shade tolerant. Alkaline soils and raw manures are not good for conifers. These plants require care in transplanting and protection from drying in early stages.

Patton, Clyde P. (N. C. Wildl. Resources Comm.) AN EXAMPLE OF STATE PARTICIPATION IN THE SOIL BANK PROGRAM FOR FISH AND WILDLIFE. 47th Conv. Internatl. Assn. Game, Fish & Cons. Comms. p. 107-111. 1957.

What wildlife practices were acceptable under the program, how the N. C. Wildl. Resources Comm. acted to popularize these opportunities, what the early results were, and what can be done to improve the program and extend its application. Discussion of this and related papers brings out the fact that certain county boards in the U. S. have actively discouraged landowners from signing up for wildlife practices. Much educational work by wildlife conservationists is needed. Fortunately, however, most features of the soil bank program will have some wildlife value.

Rajala, Paavo. ROSA RUGOSA AS FOOD FOR THE SNOW HARE. Suomen Riista 11: 155. 1957.

In Finnish with English summary on separate mimeo. sheet. This introduced rose was little used as food, much less than Salix caprea and Rosa cinnamomea. It is a good cover plant but does not justify planting for game, for native willows and juniper are good for both food and cover.

Suomus, Heikki. TURNIP AS A NUTRITIONAL PLANT FOR GAME. Suomen Riista 11: 156. 1957.

In Finnish with English summary on separate mimeo. sheet. Penned pheasants fed turnip rape seed as part of diet did as well as controls. Therefore, the plant "is very suitable for use at feeding sites and in fields sown for game."

Vohs, Paul A., Jr. (S. Ill. U., Carbondale.) A COMBINATION SALAD FOR WILDLIFE. Ill. Wildl. 13(1): 3-5, 6 photos. Dec. 1957.

Widely spaced corn interseeded with grasses and legumes is good for both farming and wildlife. This article gives much information on just how to use the practice and some information on wildlife results. "With the eight to ten million acres of corn grown in Illinois each year the improvement in wildlife habitat has colossal potential." In ordinary corn planting, space between rows is 40 inches. In new system, space is 60, 80 or 120 inches. The 60-inch spacing is best for high corn yield, with production ranging from nearly as good to better than that with 40-inch spacing. Corn serves as nurse crop for interseeded grasses and legumes. The interseeded crops build up soil, prevent erosion, provide much livestock forage, afford good food and cover for wildlife. Comparisons of wide-row fields and ordinary corn fields in s. Ill. proved that mourning doves, bobwhites, and cottontails were attracted to wide-row fields and made much use of them. "Quail were flushed from the wide-row fields more than 100 times as frequently as in the standard corn fields during summer, fall and early winter."

Voigt, L. P. (Wis. Cons. Dept.) THE SOIL BANK: WISCONSIN CONSERVATION RESERVE PRACTICES. Wis. Cons. Bul. 22(12): 3-9, 1 fig. Dec. 1957.

Unusually informative paper on just what practices qualify under the federal conservation reserve program, what the specifications are for each, how they should be applied, and what part of the cost is paid. Practices include establishment of woody cover for wildlife, plantings of winter food for wildlife, creation of wildlife ponds, level ditching, etc. A following article by Cyril Kabat, "Opportunities for fish and wildlife under the soil bank," discusses the merits and possibilities of the plan and how it has worked out in Wis. so far.

FARMLAND & WILDLIFE--Continued

Zorb, Gordon L. (Mich. Dept. Cons., Lansing.) EFFECTIVENESS OF TWO FLUSHING DEVICES USED IN HAY MOWING. J. Wildl. Mgt. 21(4): 461-462. Oct. 1957.
Closely observed tests of the "Ohio" flushing bar and an "exhaust blast" flushing device indicated that neither device lowered pheasant mortalities during hay mowing. Results were based on the cutting of 900 acres of hay over a six year period. Approximately 100 pheasant flushes were tallied for each flushing device and for a control with no flushing device. Losses of juvenile pheasants were higher when using the flushing devices as compared to the control. The number of adult hens encountered was too small to give significant results.--Author.

RANGELAND & WILDLIFE

Basile, Joseph V., and Ralph C. Holmgren. SEEDING-DEPTH TRIALS WITH BITTERBRUSH (PURSHIA TRIDENTATA) IN IDAHO. US For. Serv., Intermtn. For. & Range Exp. Sta. (Ogden, Utah), Res. Paper 54. 1-10 p., 2 figs. Dec. 1957.
Reports experiments and makes recommendations for planting under several conditions.

Carter, Meril G. (US Soil Cons. Serv., Uvalde, Texas.) RECLAIMING TEXAS BRUSHLAND RANGE. J. Range Mgt. 11(1): 1-5, 3 photos. Jan. 1958.
South Texas was once grassland. It became brushland of little grazing value, largely through overgrazing. Many restoration methods have been tried. The best, now highly satisfactory, is to rootplow with horizontal blade on which vertical fins are mounted. At the same time, selected species of grasses are seeded from the rear of the same tractor. Results are forage increases of hundreds of percent, even in a single season of drought. Ranchers interested in wildlife leave strips of brush untreated.

Eckert, R. E. (USDA, U. of Nev., Reno.) VEGETATION-SOIL RELATIONSHIPS IN SOME ARTEMISIA TYPES IN NORTHERN HARNEY AND LAKE COUNTIES, OREGON. Ph.D. thesis, Ore. State Coll. 1957. [From long abstract in J. Range Mgt. 11(1).]

Hedrick, Donald W. (Ore. State Coll., Corvallis.) PROPER UTILIZATION--A PROBLEM IN EVALUATING THE PHYSIOLOGICAL RESPONSE OF PLANTS TO GRAZING USE: A REVIEW. J. Range Mgt. 11(1): 34-43. Jan. 1958.
Good discussion of vital topic. 71 references.

Hoff, C. Clayton, and Howard Campbell. (U. of N. M., Albuquerque.) A NEW ARTIFICIAL BREEDING PLACE FOR MOSQUITOES IN NEW MEXICO. Mosquito News 17(4): 314-315. Dec. 1957.
Gallinaceous guzzlers are mosquito breeders. All 4 mosquito species found in them will bite man and 2 of them are able to transmit encephalitis.

Nord, Elmor C., and James E. Whitacre. GERMINATION OF FOURWING SALTBUSH SEED IMPROVED BY SCARIFICATION AND GRADING. US For. Serv., Calif. For. & Range Exp. Sta. (Berkeley), For. Res. Notes no. 125. 5 p. July 1957.
Artificial seeding of Atriplex canescens is important in restoring western big-game ranges. Techniques described here should be helpful.

Richards, T. H. (Calif. Game Comm.) IMPROVING WILDLIFE HABITAT. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 73-77. 1957.
Discussion of costs and benefits of improving Calif. brush ranges for game, especially deer.

FORESTLAND--FORESTRY & ECOLOGY

Bray, J. Roger, and J. T. Curtis. (U. Toronto, Ont.) AN ORDINATION OF THE UPLAND FOREST COMMUNITIES OF SOUTHERN WISCONSIN. Ecol. Monog. 27(4): 325-349, 9 figs. Oct. 1957.

Buell, Murray F., and Wm. A. Niering. (Rutgers U., New Brunswick, N. J.) FIR-SPRUCE-BIRCH FOREST IN NORTHERN MINNESOTA. Ecology 38(4): 602-610, 5 figs. Oct. 1957.
Describes this community and its successional relationships. All stands studied had followed pine. The stands gave every indication of perpetuating themselves.

Clausen, J. Johanna. (U. Minn., Minneapolis.) A PHYTOSOCIOLOGICAL ORDINATION OF THE CONIFER SWAMPS OF WISCONSIN. Ecology 38(4): 638-646, 5 figs. Oct. 1957.
Ecological relationships of spruce-tamarack swamps and cedar-balsam swamps are discussed on basis of study of 106 swamps.

Hodgkins, Earl J. (Ala. Polytechnic Inst., Auburn.) EFFECTS OF FIRE ON UNDERGROWTH VEGETATION IN UPLAND SOUTHERN PINE FORESTS. Ecology 39(1): 36-46, 3 photos. Jan. 1958.
"This paper reviews the literature on vegetational changes following fires in upland southern pine forests and reports on changes following experimental burnings in northwestern Alabama..."

Johnson, Albert Willard. ECOLOGY OF SUBALPINE FOREST COMMUNITIES IN THE SILVER LAKE VALLEY OF THE FRONT RANGE IN COLORADO. Ph.D. thesis, U. Colo. 134 p. 1956. [From long abstract in dissertation Abstracts 17(12).]

Leaf, Albert L. (State U. of N. Y. Coll. For., Syracuse U.) EFFECT OF GRAZING ON FERTILITY OF FARM WOODLOT SOILS IN SOUTHERN WISCONSIN. J. For. 56 (2): 138-139. Feb. 1958.
Concrete evidence that grazing exerts a profoundly adverse effect on the chemical properties of forest soils.

Maycock, Paul Frederick. THE PHYTOSOCIOLOGY OF BOREAL CONIFER-HARDWOOD FORESTS OF THE GREAT LAKES REGION. Ph.D. thesis, U. Wis. 355 p. 1957. [From long abstract in Dissertation Abstracts 17(10).]
Based on detailed analysis of 110 forest stands. "To imply that any particular community is either representative of the Boreal or Deciduous forest; or that it possesses characteristics entirely its own, is to refute its continuous nature in terms of this floristic composition and the ecological relations of its component species. These forests of the lake region are considered to form a vegetational continuum and to be inseparably related to all neighboring vegetational types."

Penfound, Wm. T., and E. L. Rice. (U. Okla., Norman.) AN EVALUATION OF THE ARMS-LENGTH RECTANGLE METHOD IN FOREST SAMPLING. Ecology 38(4): 660-661. Oct. 1957.
From summary: "2. The method consisted of a series of 60 arms-length rectangles of 0.01 acre each, in which the DBH of all tree species and the list of all saplings were recorded. The comparison was made primarily on the basis of relative frequency, relative density, relative basal area and importance percentage. 3. Except for relative frequencies for the most abundant species, and the data on American elm, the values obtained by the arms-length rectangle method approximated closely those obtained by the complete census. 4. In view of the meager equipment needed (compass, diameter tape and clip board) and the short time needed for sampling, this method is recommended for forest analysis."

Weaver, Harold. (3505 N.E. Schuyler, Portland 13, Ore.) EFFECTS OF PRESCRIBED BURNING IN SECOND GROWTH PONDEROSA PINE. J. For. 55(11): 823-826, 5 photos. Nov. 1957.
Prescribed burning on Klamath Indian Res. in s. Ore. greatly decreased danger of serious wildfire. It also caused understory of bitterbrush to be replaced by grass. Bitterbrush, although a prime browse plant, is regarded as particularly obnoxious in hindering forest regeneration.

White, D. P., and A. L. Leaf, compilers. FOREST FERTILIZATION; A BIBLIOGRAPHY, WITH ABSTRACTS, ON THE USE OF FERTILIZERS AND SOIL AMENDMENTS IN FORESTRY. State U. Coll. of For., Syracuse 10, N. Y., Tech. Publ. no. 81. World For. Ser. Bul. no. 2. 305 p. 1957. Price not stated. [From J. For. 55(11).]

Bailey, James. (Coll. For., Syracuse U., Syracuse, N. Y.) CONIFER PLANTATIONS AS HABITAT FOR RUFFED GROUSE AND OTHER WILDLIFE. Presented at 1958 conf. NE. Sec. Wildl. Soc. et al. 19 p., 2 maps, proc. Jan. 1958.

Although based on work with grouse near Syracuse, N. Y., much of what Bailey says is applicable to understanding and management of large blocks of conifers anywhere. A 256-acre tract of closed-canopy conifer plantations was selected. Survey lines through it were studied for grouse and grouse sign in summer of 1957. Interiors of stands were little used by grouse except where broken by old hedgerows, patches of hardwoods, or other types that provided food and cover suitable for grouse. Where good grouse habitat was adjacent to plantation, fair numbers of grouse penetrated into stand for distances of at least 4-5 chains (1 chain = 66 ft.). In planning conifer plantations with wildlife in mind, plantations probably should be no more than 10 chains across, and they should be shaped to give as much edge as possible. Spots unsuited to commercial forest should be left for wildlife. Strips can be left open along hedgerows. Ponds and marshes can be created and the margins left brushy. Trees of special wildlife value (apple, cherry, etc.) can be released and fertilized. Species and age classes of conifers can be mixed in various patterns suggested here. A band of spruce around a planting of pine may increase cover value of whole plot. Wildlife and recreational values can be increased by system of travel lanes; these will also help in fire control and other forestry work. Removal of all hardwoods should be limited to the best sites, where the work is most justified. Thinning of plantations may improve areas for wildlife and is needed anyway. Pruning of lower limbs should be limited to future crop trees; outer rows of a stand should be left unpruned to maintain edge values and reduce wind penetration. In addition to research results and recommendations, this paper includes an exceptional amount of discussion of the problem of conifer plantations as wildlife habitat.

Davison, Verne E., and Karl E. Graetz. (Soil Cons. Serv., Auburn, Ala.) MANAGING HABITAT FOR WHITE-TAILED DEER AND WILD TURKEYS. Trans. 22nd N. Am. Wildl. Conf. p. 412-424. 1957.

An agricultural evaluation of plant-foods and water for white-tailed deer and wild turkeys. Lists 161 choice and 230 less desirable deer foods; 67 choice and 81 less desirable turkey foods; notes that more than 270 deer foods and 60 turkey foods are too minor to list. Deer eat almost every plant that turkeys eat. In the se. states, the SCS recommends winter-grazing plants--grasses and clovers--up to 2% of woodland acreage. The authors believe that grasses and herbs are utilized more and are more important foods than shrub and tree species; that usual methods of deer-food study exaggerate the woody browse and fail to evaluate herbaceous foods adequately. Foods grown by cultivation, fertilization, liming etc. increase the health, body weight, antlers and reproductive rate of deer (and probably turkeys). However, increased foods are no substitute for herd management to prevent over-grazing and over-browsing.--V. E. Davison.

Gysel, Leslie W. (Mich. State U., E. Lansing.) EFFECTS OF SILVICULTURAL PRACTICES ON WILDLIFE FOOD AND COVER IN OAK AND ASPEN TYPES IN NORTHERN MICHIGAN. J. For. 55(11): 803-809, 6 figs. Nov. 1957.

Low-grade oak stands were treated to release red pine. Girdling, cutting, basal sprays, aerial sprays, and chemicals in frills were used. All or most oak was removed. Growth of pine in release areas was double that of controls in 5 years. Herbs, shrubs, seedlings and sprouts increased greatly. Sprouts were more numerous and larger in areas treated with axe than in areas sprayed. Food and cover conditions for deer, grouse, rabbits and some other animals seemed much improved. Winter use by deer was proportional to amount of pine. Use by rabbits was greatest where ground cover was dense. Game conditions will deteriorate as pines grow large; then the main value of the release areas may be in providing diversity in large areas of hardwoods. Cutting of aspen caused dense stands of sprouts and suckers. These provided 2-3 times as much browse as did release treatments in oak stands. Aspen sprouts were much more numerous in clear-cut areas than in commercially cut areas, where non-merchantable trees were left. Bulldozing of oak created only a little good browse and cover. Bulldozing in aspen caused marked increase in sprouts. In both oak and aspen, treatments made great changes in stand composition but not in species composition. Utilization of seedlings, sprouts, and shrubs by deer and rabbit had no silvicultural ill-effect. Instead, it was beneficial in keeping sprouts low in oak areas and may have been helpful in thinning dense stands of aspen sprouts.

Kelley, Charles D. TIMBER STAND IMPROVEMENT AND WILDLIFE. Ala. Cons. 29(4): 4-5, 2 photos. Dec.-Jan. 1957-58.

Brief, general report of group visit to T.S.I. areas on Bankhead Natl. For. and 2 paper co. lands. U. S. For. Serv. is leaving den trees and certain food-producing hardwoods. Group felt T.S.I. on Bankhead Forest was not adverse to game, but that more research was needed on T.S.I. vs. game. The 2 paper companies have hired wildlife men. These companies may slow T.S.I. owing to increasing utilization of hardwoods. They are not using T.S.I. in stands of stream bottom hardwoods. Deer and quail are expected to find suitable habitat in pine of T.S.I. areas. In some areas, runner oaks may replace removed tree oaks and provide turkey habitat. Prescribed burning in longleaf pine stands apparently has created favorable habitat for deer, turkey, and quail. One company has prohibited cutting of dogwood and certain other plants that provide good deer and turkey food.

Kverno, Nelson B., and Harry D. Hartwell. PROGRESS REPORT / PACIFIC NORTHWEST 1955-56 and 1956-57 EXPERIMENTAL SEEDING STUDIES. US F&WS, Wildl. Res. Lab., Denver 2, Colo. ii + 50 p., mimeo. Nov. 1957.

Reports of experiments by various agencies and companies. Chief aims were to determine effectiveness of Endrin coating in protecting Douglas-fir seed from rodents and to test value of various adhesive and fungicidal additives. "Other studies dealt with such diverse problems as the protection of natural seedfall with treated seed, rodent damage to first year seedlings, the relationship of time of seeding to seedling production, losses of treated and untreated seed on areas sown with treated seed, the effects of various non-biotic factors on seedling production, and the survival of seeded plantations." Endrin coating was relatively effective in protecting Douglas-fir seed. Use of treated seed to protect natural seedfall was not successful, however, for rodents recognized and selected untreated seed. Rodents were found responsible for heavy clipping of young seedlings. Seedlings of 4-5 years were seriously browsed by deer and rabbits in some areas; in other areas, growth and survival was good despite earlier browsing. Production and survival of seedlings depends on many factors; one of the most important factors is good preparation of seed-bed, as by removal of slash and duff.

Nettleton, Harry I. (Ore. State Coll., Corvallis.) WOOD RATS DAMAGE YOUNG DOUGLAS-FIR. J. For. 55(11): 845. Nov. 1957.

Girdling of tops and branches by Neotoma fuscipes was heavy in dense stands, absent in thin stands. Poisoning with thallium-treated bait is recommended.

Shomon, J. J. (Va. Comm. Game.) THE AMAZING WILLOW. Va. Wildl. 18(12): 5-8, illus. Dec. 1957.

Points out the great value of willows to different kinds of game, urges planting of willows for game and soil conservation, and tells how to plant them from cuttings.

## STRIPPED LAND & MISCELLANEOUS HABITATS

Hall, I. G. (For. Res. Sta., Farnham, Eng.) THE PLANT ECOLOGY OF COLLIERY SPOIL HEAPS AND OPENCAST IRONSTONE WORKINGS. Proc. and Papers Internatl. Union Cons. Nat. & Nat. Resources 6: 134-136. 1956. [From Biol. Abs. 31(12).]

A general ecological survey of English colliery spoil [slag] heaps, and of opencast ironstone workings in Northants, was made by the Forest Research Station. Exposure, spoil constitution and acidity, local toxicity, erosion, surface instability, burning of the spoil, local climate, atmospheric pollution, and human interference may limit plant and tree growth, but generally the colliery spoil heap environment is not especially adverse. Opencast ironstone workings are more favorable to plant and tree growth than are most colliery spoil heaps.--I. G. Hall.

Hall, I. G. (For. Res. Sta., Alice Holt, Farnham, Surrey, Eng.) THE ECOLOGY OF DISUSED PIT HEAPS IN ENGLAND. J. Ecol. 45(3): 689-720 + 2 pl. & 2 inserted folding tables. Nov. 1957.

Spoil banks of British coal fields were surveyed at 200 sites with regard to age, shape of mounds, texture and composition, pH values, erosion, and influence of grazing and human activity. Plant composition, communities, and succession are analyzed in detail and the data are presented in tables.--L. F. Stickel.

Lewis, Wm. M., and Charles Peters. (S. Ill. U., Carbondale.) PHYSICO-CHEMICAL CHARACTERISTICS OF PONDS IN THE PYATT, DESOTO, AND ELKVILLE STRIP MINED AREAS OF SOUTHERN ILLINOIS. Trans. Am. Fisheries Soc. 84: 117-124, 3 figs. 1954 [1955].

Riley, Charles V. (Kent State U., Kent, Ohio.) RECLAMATION OF COAL STRIP-MINED LANDS WITH REFERENCE TO WILDLIFE PLANTINGS. J. Wildl. Mgt. 21(4): 402-413, 1 map. Oct. 1957.

SE. Ohio had approx. 102,706 acres of coal stripped lands in Jan. 1956. Author set up 72 plots to evaluate 37 spp. of planted plants of potential wildlife value. Plants included 9 spp. of legumes, 5 spp. of grasses, 5 spp. of shrubs, 8 spp. of conifers and 8 spp. of hardwoods. Other areas contained volunteer plants. Study areas were selected to represent varied site conditions. Of 5 spp. of lespedeza, Lespedeza bicolor and L. cuneata were most successful and adaptable. L. cyrtobotrya, L. thunbergii and L. stipulacea were more exacting. Melilotus alba and M. officinalis were successful on varied sites. Trifolium hybridum grew very well in moist depressions. Mixed seedings, including Medicago sativa, Melilotus alba, M. officinalis, Trifolium hybridum, Bromus inermis, Lolium perenne, Poa pratensis and Phleum pratense, furnished satisfactory wildlife habitat after 2 growing seasons. These spp. grew very well on a wide range of sites. Scotch broom, a shrub, was outstanding in growth and survival. Amorpha fruiticosa had excellent growth, survival, and spread on alkaline soil. Rosa multiflora did poorly. Pinus strobus, P. echinata, P. rigida, P. nigra, P. resinosa, P. banksiana, P. sylvestris and Picea abies did very well and provided good winter cover. Robinia pseudoacacia was the outstanding hardwood. Native plants readily invaded the locust plantations and formed dense understory in 10-15 years.--Author.

## CONTROL OF UPLAND VEGETATION WITH HERBICIDES ETC.

Atkins, E. S. SUSCEPTIBILITY OF CERTAIN TREES OF EASTERN ONTARIO TO BASAL BARK SPRAYS. Can. Dept. N. Affairs & Natl. Resources (Ottawa), For. Res. Div. Tech. Note no. 38. 5 p. 1956. [From J. For. 56(1).]

Byrnes, W. R., W. C. Bramble, and R. J. Hutnik. (Pa. State U., U. Park.) EFFECT OF VOLUME OF SPRAY UPON TOP KILL AND RESURGE OF OAK-MAPLE BRUSH. Proc. 12th Ann. Meeting NE. Weed Control Conf. p. 230-238, mimeo. Jan. 1958.

Byrnes, W. R., W. C. Bramble, and P. P. Worley. (Pa. State U., U. Park.) A TEST OF 2,4,5-TP, 2,4,5-TA AND ATA ON MIXED OAKS AND ASSOCIATED SPECIES. Proc. 11th Ann. Meeting NE. Weed Control Conf. p. 188-195, mimeo. Jan. 1957.

Tests were made on powerline right-of-way through Pa. gameland. Results 3 years after treatment are reported in detail for various species.

Cable, Dwight R. (US For. Serv., Ariz. State Coll., Tempe.) CHEMICAL CONTROL OF CHAPARRAL SHRUBS IN CENTRAL ARIZONA. J. For. 55(12): 899-903, 3 figs. Dec. 1957.

Report of tests and costs. Recommends selective basal treatment with mixture of 2,4-D and 2,4,5-T to spare desirable browse species. Costs were too high for general use of method.

Carter, M. C., and W. E. Chappell. (Duke U., Durham, N. C.) THE EFFECT OF CARRIER, FORMULATION OF PHYTOCIDE, AND TIME OF TREATMENT ON THE PERCENTAGE KILL OF CERTAIN WOODY PLANTS. Proc. 11th Ann. Meeting NE. Weed Control Conf. p. 209-218, mimeo. Jan. 1957.

"In general, all of the species of woody plants studied were more susceptible to 2,4-D and 2,4,5,-T at the time of the May treatments than they were at the time of any other treatments." Only exception was black gum, which was most susceptible in June and Aug. Tests reported in this paper were made in oak-hickory community in Va.

Chappell, W. E., and R. E. Sayre. (V.P.I., Blacksburg, Va.) PROGRESS REPORT ON DORMANT APPLICATIONS OF BRUSH KILLERS ON POWER LINE RIGHTS OF WAY. Proc. 12th Ann. Meeting NE. Weed Control Conf. p. 220-224, mimeo. Jan. 1958.

Egler, Frank E. (Aton For., Norfolk, Conn.) RIGHTOFWAYS AND WILDLIFE HABITAT: A PROGRESS REPORT. Trans. 22nd N. Am. Wildl. Conf. p. 133-142. 1957.

Unfavorable developments in vegetation management on rightofways in the last 4 years are so extensive that the action of conservationists is urgently needed. This domain is now estimated at over 50 million acres. It is under policies dictated almost entirely by utility engineers, influenced by line-clearance engineers, in turn by chemical engineers. These policies promote permanent destruction of a large proportion of the potential wildlife habitat. Further research and demonstration are not needed. Suitable demonstration areas already occur in most of the eastern states. The major problem is to get proper management principles accepted and used.--Author.

Hodgdon, A. R. (N. H. Agr. Exp. Sta., Durham.) VEGETATIONAL SURVIVAL ON SOME PUBLIC UTILITY LINES IN NEW HAMPSHIRE FOLLOWING FOLIAGE SPRAYING WITH 2,4-D AND 2,4,5-T ESTERS. Proc. 12th Ann. Meeting NE. Weed Control Conf. p. 239-245, mimeo. Jan. 1958.

Trees were eliminated, reduced, or weakened. Alder, willows, and sumac were nearly or quite destroyed. Blueberry species were killed or recovered only in 2-3 years. On the whole, shrubs, especially low spreading types, were remarkably resistant, although some appeared at first to be killed. No large, lasting damage was done to any species of herbaceous plant.

Indyk, Henry W. (U. Del., Newark.) CHEMICAL CONTROL OF BRUSH ON DRAINAGE DITCH BANKS. Proc. 12th Ann. Meeting NE. Weed Control Conf. p. 246-256, mimeo. Jan. 1958.

Includes good data on chemicals, carriers, and seasons found best for control of various types of woody plants in Del.

Launchbaugh, J. L., H. H. Biswell, and A. M. Schultz. (Kans. Agr. Exp. Sta., Hays.) THE CONTROL OF DIGGER PINE WITH HERBICIDES PLACED IN BASAL CUTS. J. Range Mgt. 11(1): 14-18, 5 figs. Jan. 1958.

Niering, Wm. A. CHEMICAL CONTROL OF WOODY PLANTS: A SUMMARY. Proc. 10th Ann. Meeting NE. Weed Control Conf. p. 212-221, mimeo. Jan. 1956.

Reviews many methods and their results and discusses such problems as maintenance of rights-of-way. 29 references.

Niering, Wm. A. (Conn. Coll., New London, Conn.) THE CONNECTICUT ARBORETUM RIGHT-OF-WAY DEMONSTRATION AREA PROGRESS REPORT. Proc. 11th Ann. Meeting NE. Weed Control Conf. p. 203-208, mimeo. Jan. 1957.

Statement of objectives and report of tests of ways of keeping a powerline right-of-way in desired types of plants. Kill of greenbrier requires good stem coverage with high concentration of herbicide. Basal sprays were more effective (and safer for other plants) than stem-foliage sprays in killing sprout hardwoods. Promising adaptation of basal spray technique is application of herbicide only to root-collar at ground level. Related matters are also discussed.

Shipman, R. D. (SE. For. Exp. Sta., Asheville, N. C.) EFFECT OF SEASON OF TREATMENT ON GIRDLING AND CHEMICAL CONTROL OF OAK AND SWEETGUM. J. For. 56(1): 33-35, 4 figs. Jan. 1958.

Shrauder, Paul A. THE EFFECT OF CHEMICAL SPRAYING FOR RIGHT-OF-WAY BRUSH CONTROL ON PRODUCTION OF DEER BROWSE. M. S. thesis, Pa. State U. 1954.--P. F. English.

Wiltse, M. G., R. L. Dolton, H. C. Ferguson, and W. R. Rossman. (Dow Chem. Co., Midland, Mich.) COMPARISONS OF COMMERCIAL HERBICIDES FOR BRUSH CONTROL ON POWER LINE RIGHTS-OF-WAY. Proc. 12th Ann. Meeting NE. Weed Control Conf. p. 201-211, mimeo. Jan. 1958.

Working Unit of Land Subcommittee. NOXIOUS WEED CONTROL AND BRUSH MANAGEMENT IN WISCONSIN. Natural Resources Committee of State Agencies, Madison, Wis. 24 p., illus. 1958.

The problem of weed and brush control can bring state agencies into conflict. This pamphlet represents a joint viewpoint. It points out that certain noxious weeds must be controlled, and that weeds and brush in general may require control for maintenance of agriculture, rights-of-way, and highways. It also points out that most weeds and brush are of value to wildlife and in control of erosion. Wild growths often include plants that are important elements of natural beauty. The pamphlet tells what the responsibilities of various state agencies are in regard to control of vegetation. Photographs show places where weed and brush control should and should not be practiced. Authors recommend expanded programs of cooperation and education for effective--but reasonable--control work. They also urge that local authorities consider certain criteria before placing plants on the list of noxious weeds that legally must be controlled. [The compromise of divergent interests represented by this paper is in welcome contrast to the extreme recommendations for wholesale extermination of wild vegetation that we are beginning to see.]

## MAMMALS--GENERAL

Caesar, Gene. THE WILD HUNTERS. G. P. Putnam's Sons, 210 Madison Ave., N. Y. 16, N. Y. 1-252, with pen and ink drawings. 1957. $3.75.

A set of gripping stories about wolves, bears and big cats of N. Am. coupled with pleas for conservation of these animals. The stories are action-packed and gory, reading for men. Some are fictional accounts of fights between wolves and bears, puma and jaguar. Some are factual accounts of men hunting and killing animals. But of greatest reference value are the accounts of animals attacking people. Here Caesar brings together much good information, presents it interestingly, and puts it in proper perspective, stressing the rarity and abnormality of such attacks. He also tells a good bit about the biology of the animals, and lists some good references. But the book is intended for hunters rather than biologists and need not be criticized as a biological reference. Caesar is a hunter and professional writer. He believes our larger predators will be gone within 50 years, doomed by grazing interests, salmon interests, habitat destruction, pulp cutting in wilderness areas, traditional biases favoring predator control, and lack of intelligent action by game agencies. He urges hunters to mobilize in defense of the large flesh-eaters--the finest of game--but does not expect that they will. There is a great deal in what he says and much of his pessimism is justified. There are spots, however, where he seems intemperate and places where his understanding of biological and conservation matters is inadequate; e. g., in discussing the naming of bears, grazing in national forests, and present status of puma. Considering the audience to which the book is directed, these deficiences should not overshadow the fact that Caesar has written a colorful, exciting book and has made the most forthright argument of recent years for saving our large predators.

Cowan, I. McT., A. J. Wood and W. D. Kitts. (U. of B. C., Vancouver.) FEED REQUIREMENTS OF DEER, BEAVER, BEAR AND MINK FOR GROWTH AND MAINTENANCE. Trans. 22nd N. Am. Wildl. Conf. p. 179-186. 1957.

An assessment of feed requirements in relation to physiological age, and under controlled conditions, is reported for black-tailed deer, mule deer, bighorn sheep, beaver, black bear, and mink. Use of these values for assessing adequacy of wild feed conditions is suggested. It is shown that deer undergo an annual cycle in feed intake that features restriction during winter. This may be of fundamental importance to survival of wild populations on winter-restricted ranges.--I. McT. Cowan.

Johnston, Richard F. (Coll. Agr., State Coll., N. M.) ADAPTATION OF SALT MARSH MAMMALS TO HIGH TIDES. J. Mamm. 38(4): 529-531. Nov. 1957.

In general, the small mammals of San Pablo marsh, Contra Costa Co., Calif., survive by resting on floating debris. Most species are good swimmers and divers. Large losses of nests and young occur. Species discussed are: Sorex vagrans, Microtus californicus, Reithrodontomys raviventris, and Rattus norvegicus. The rat is the best swimmer and diver of the group; the harvest mouse is the poorest.

Stains, Howard J. (S. Ill. U., Carbondale.) FIELD KEY TO GUARD HAIR OF MIDDLE WESTERN FURBEARERS. J. Wildl. Mgt. 22(1): 95-97. Jan. 1958.
This key is based chiefly on coloration and length. We have not tested it, but in our experience all hair keys should be used with much caution. This is also indicated by the author's statement that the key was about 85% effective in tests with known specimens.

## MAMMALS--FAUNAS AND MANUALS

Clothier, Ronald Raymond. DISTRIBUTION OF THE MAMMALS OF THE SANDIA AND MANZANO MOUNTAINS, NEW MEXICO. Ph.D. thesis, U. of N. M. 220 p. 1957. [From abstract in Dissertation Abstracts 17(10).]
Faunistic study, with consideration of factors limiting distribution in area.

Hoffmeister, Donald F., and Carl O. Mohr. FIELDBOOK OF ILLINOIS MAMMALS. Ill. Nat. Hist. Surv. (Urbana), Manual 4. xi + 233 p., 119 figs., 1 col. pl. June 1957. $1.75, cloth. Make check payable to State Treas. of Ill.
Although a shade smaller than a Peterson field guide, this is really a first-class handbook--and one of the best bargains on the market. Semitechnical in nature, it is useful to any layman or naturalist who is willing to learn. Many illustrations of diagnostic features and a glossary iron out technicalities. There are good photographs of each species. Illustrated keys to animals in the flesh and keys to skulls should make most identifications simple and reliable. Each species is described and its measurements are listed. Life histories are summarized readably but in good detail. Signs such as tracks, scats, burrows and the like are discussed briefly for each species and also in an introductory section, where tracks and workings are illustrated. Ranges are stated in a general way for both Ill. and N. Am. Maps of ranges in U. S. are supplied for species that occur in only part of Ill. Status and subspecies in Ill. are mentioned in connection with ranges. Short sections at the beginning of the manual introduce the concepts of habitats and ranges, tell how to study and collect mammals, and discuss interpretation of various kinds of signs. Each order of mammals is introduced with a brief characterization and a popular review of economic status of its species. Several fossil mammals are discussed and illustrated at the back of the book, where there is also a short section on conservation of mammals and the desirability of sound land use. In general, however, conservation and wildlife management are not emphasized. The book includes an adequate list of selected references and an index.

Ivey, R. DeWitt. (3312 Alvarado Drive, NE., Albuquerque, N. M.) ECOLOGICAL NOTES ON THE MAMMALS OF BERNALILLO COUNTY, NEW MEXICO. J. Mamm. 38(4): 490-502, 1 map. Nov. 1957.
Major zones and communities are outlined. Occurrence or ecological distribution of 50 kinds of mammals is discussed in annotated list.

Jones, J. Knox, Jr. (Mus. Nat. Hist., U. Kans., Lawrence.) CHECKLIST OF MAMMALS OF NEBRASKA. Trans. Kans. Acad. Sci. 60(3): 273-282. 1957.
Lists species and subspecies present in Nebr. and gives brief indication of their distribution in state. Hypothetical list is appended.

Palmer, E. Laurence. PALMER'S FIELDBOOK OF MAMMALS. E. P. Dutton & Co., 300 Fourth Ave., N. Y. 10, N. Y. 1-321 p., illus. 1957. $3.75, cloth.
This book by a former professor of nature education at Cornell should not be confused with "The Mammal Guide" by Ralph S. Palmer (see WR 77: 18). The present volume is intended mainly as a reference for youngsters and grade-school teachers. Like most extensive compilations by nonspecialists, it has much good material, some weak material, and some highly questionable material. The book is a compendium of a vast amount of information about some 300 kinds of mammals, mostly N. American. It treats 1 or more mammals of each order in the world, however, emphasizing important or interesting kinds. Domestic animals, their biology and varieties, get much attention--dogs get 50 p. A typical account runs 1 p.; has a pen sketch of the animal and small, simple sketches of its skull, tracks, and scat; outlines habits and distribution; mentions related kinds; gives formulae for teeth and tracks; tells a little about reproduction; and may give figures on relative durability of pelt, longevity, temperature, pulse rate, or

rate of respiration. Introductory pages discuss senses, homes and sanitation, economic relations to man, and similar topics. The book contains an enormous number of miscellaneous facts in compact form and hence will have some value to biologists for quick reference, but it should not be trusted as authoritative. A few objectionable points noted in glancing through the book are: Strong measures are said to be taken to prevent establishment of hamsters in the wild; actually, these animals are sold freely as pets. Lions are considered extinct in Asia; they still exist there and conservation efforts are being made. Jaguarundis are not mentioned as occurring in Fla. The U. S. National Museum is said to recognize 75 spp. of Ursus, no doubt because those forms are listed by Miller and Kellogg, which does not imply U.S.N.M. acceptance. Subspecific names are applied to groups of domestic dogs and a family tree of these dogs is presented; both seem presumptuous in view of disagreements and limited knowledge. A white-tailed deer is said to require about 1 sq. mi. of territory; the common occurrence of many deer per sq. mi. is not mentioned. Size stated for these deer makes no allowance for the small races.

Rapp, Wm. F., Jr. A PROVISIONAL CHECK-LIST OF THE MAMMALS OF NEBRASKA. Div. Sanitation, Nebr. State Dept. Health (Lincoln). 16 p., mimeo. 1957. [From J. Mamm. 38(4).]

Rickard, Wm. H., Jr. THE DISTRIBUTION OF SMALL MAMMALS IN RELATION TO CLIMAX VEGETATION PATTERNS IN EASTERN WASHINGTON AND NORTHERN IDAHO. Ph.D. thesis, State Coll. Wash. 66 p. 1957. [From long abstract in Dissertation Abstracts 18(1).]

Twenty-four stands representing 14 climax vegetation associations were studied. Trapping was done with snap traps; a trapping period ordinarily consisted of 3 nights; trapping was done at monthly intervals. Six hundred mammals of 11 spp. were taken in 14,175 trap nights. The plant associations within which each kind of mammal occurred are discussed. "Climax vegetation patterns would seem to be significantly correlated with the distribution of certain small mammals and much critical autecologic information would be lost unless trapping patterns are correlated with specific plant associations. Subordinate components of the plant community appear to be so important in this respect that the definition of plant associations as particular combinations of unions is specially useful, for unions express the variation in the floristic composition, physiognomy, and phenology which are important in determing the suitability of vegetation for the requirements of small mammals."

Sherman, H. B. (DeLand, Fla.) GENERAL BIOTIC RELATIONSHIPS OF THE FLORIDA MAMMAL FAUNA. Quart. J. Fla. Acad. Sci. 20(3): 149-173, map. 1957.

"In the following pages an attempt is made to describe in general terms and with little technical language the relationships in time and space of the families and genera of mammals which have been recorded from Florida and to bring up to date the list of recent mammals. Literature essential to this paper is cited to supplement the bibliography published in 1952." Includes complete checklist of Florida mammals.

## MAMMALS--POPULATIONS, HOME RANGES, COMMUNITIES

Anon. MICE SPUR WATERFOWL MIGRATION. Outdoor News Bul. 12(2): 2. Jan. 31, 1958.

"A horde of lowly meadow mice, swarming over fields and stripping them of foodstuffs planted for ducks and geese, has forced thousands of waterfowl to hasten their migrational flight, the Wildlife Management Institute reports. It happened this past fall in the Klamath Basin, the famous waterfowl crossroads of the West that straddles the Oregon-California boundary. The tremendous build-up of field mice is causing concern among public health authorities as well as farmers and wildlife people. 'What grain the mice have not eaten, they have buried for their winter stores,' says the Oregon State Game Commission. 'They have perforated ditch banks making water control difficult.' The mice appear to be increasing despite concentrated applications of poisons, and economic losses, at last report, exceeded $5 million. Ironically, many disappointed waterfowl hunters are said to have blasted away at the large number of hawks and owls that were attracted by the army of mice." [Complete.]

Blair, W. Frank. (U. Texas, Austin.) EFFECTS OF X-IRRADIATION ON A NATURAL POPULATION OF THE DEER-MOUSE (PEROMYSCUS MANICULATUS). Ecology 39(1): 113-118, 2 graphs. Jan. 1958.

Summary: "An attempt was made to upset the equilibrium between mutation pressure and selection pressure in a natural population of deer-mice...through irradiation of sexually mature males. The work was done in central Texas, where a population was kept under observation by use of nest boxes. After one year of observation in 1951-52, exposure of males to a 500r gonadal dose of x-ray was begun and continued through 1955-56. Certain aspects of population dynamics were highly pertinent to the conduct of the experiment and to the results obtained. Deer-mice are primarily winter breeders in central Texas. Relatively permanent mating pairs are formed. The average dispersal distance of the young is short. The life span is short and population turnover high, indicating high environmental pressure on the population. Reduction in litter size is attributed to radiation-induced lethal mutations. Maintenance of population numbers through four years of irradiation is attributed to high selection pressure, and a consequently high 'critical mutation rate' in a species such as this."

Charles, W. N. THE EFFECTS OF A VOLE PLAGUE IN THE CARRON VALLEY, STIRLINGSHIRE. Scot. For. 10: 201-204. 1956. [From J. Anim. Ecol. 26(2).]

"Vegetation changes; damage outside the forest; sampling. Up to 75% (locally 100%) of plantation trees up to 15 years old were damaged or killed."

Crowcroft, Peter, and F. P. Rowe. (Brit. Mus. Nat. Hist., London, S.W. 7.) THE GROWTH OF CONFINED COLONIES OF THE WILD HOUSE-MOUSE (MUS MUSCULUS L.). Proc. Zool. Soc. London 129(3): 359-370, 1 graph. Nov. 1957.

Summary: "1. The growth of four confined populations...was studied for approximately eighteen months. Each colony was started with one male and two females and constantly provided with excess food and water. Censuses were carried out fortnightly at first, and later monthly. 2. The variation in the rate of increase was greatest in the early stages, but all four colonies contained comparable numbers after eighteen months. 3. The main factor limiting population growth was the low fecundity rate of the females. Reproduction ceased altogether after ten months in the colony which grew most rapidly and had the most stable social structure. 4. Most females with closed or partly closed vulvae were found at post-mortem to have inactive ovaries, thread-like uteri and excessive fat deposits. Most adult males remained fecund at all stages of population growth. 5. The survival rates of infants, juveniles, and adults of both sexes, were not significantly affected by increased total numbers." High survival of young was attributed to provision of cover in which nests could be built and defended. Most of the observed infant mortality was attributed to observer disturbance, a factor that varies in importance with social organization of colony. Reduction of ♀ fecundity was greatest in the pen where there was little fighting. Some consequence of confinement, other than fighting or food shortage, apparently reduced population increase by inhibiting ovarian activity.

Frenzel, Louis Daniel. A STUDY OF SMALL-MAMMAL POPULATIONS OF STATE ISLAND, BASSWOOD LAKE, MINNESOTA. Ph.D. thesis, U. Minn. 232 p. 1957. [From long abstract in Dissertation Abstracts 18(1).]

A 9.2-acre island was live-trapped, with traps spaced 45 ft. apart, during summers of 1951-54. Animals were marked and released except in a terminal snap-trapping. Chief species were meadow vole (M. pennsylvanicus), red-backed vole (C. gapperi), jumping mouse (Z. hudsonius), and deer mouse (P. maniculatus gracilis). Both voles increased 1951-52 and declined 1953-54. Jumping mice declined throughout study. Deer mice were present in 1953-54 but not earlier in study. Trapping mortality was heavy, varying from 0-100% and av. 27%. Trap-revealed longevity of meadow voles and jumping mice was 14 and 24 months, respectively. "All species involved were shown capable of avoiding capture throughout extensive live-trapping efforts indicating that live-trapping methods yield underestimations of numbers actually present." Peromyscus and Synaptomys cooperi immigrated to island, presumably over ice. Two Microtus recaptured elsewhere in a second year showed travel up to 1.5 mi. Mean areal movements, as described by Blair's maximum boundary strip method, were 0.42 acres for Microtus, 0.83 acres for Clethrionomys, 1.39 acres for Zapus, and 1.32 acres for 8 juvenile Peromyscus. Habitat preferences of the species are described.

Kalela, Olavi. (Zool. Mus., U. of Helsinki, Finland.) REGULATION OF REPRODUCTION RATE IN SUBARCTIC POPULATIONS OF THE VOLE CLETHRIONOMYS RUFOCANUS (SUND.). Ann. Acad. Sci. Fennicae Ser. A., Sect. IV (Biol.) no. 34. 1-60 p., 13 figs. 1957.

In English. Report of extensive, detailed study. Reproductive biology of Clethrionomys rufocanus was studied during population highs and lows. Growth rate of populations was lower in 1955 (high population) than in 1954 (low population). In 1954, nearly all young born early in the season were sexually mature by fall, whereas in 1955 almost all ♂♂ remained immature. In areas of very dense population in 1955, the bulk of juv. ♀♀ remained immature also. Most adult ♀♀ had 3 litters per season, some juv. ♀♀ had 2 litters. In 1954, some ad. ♀♀ probably had 4 litters. The commonest litter size was 6, and this did not vary with the year. It was concluded that the regulation of fecundity rates was not through shortage of food, for summer food was abundant in 1955 and even preferred foods were not exhausted in the winter of 1955-56. On the other hand, it was apparent that the voles were well able, in a few years, to reach numbers large enough to exhaust their supplies of preferred food even during a single winter unless checked by some controlling factor. The author attributes the regulation of numbers of these voles to intraspecific intolerance arising from increasing numbers.--L. F. Stickel.

Kinney, Alva R., Dean H. Ecke, and Virgil I. Miles. (U. S. Publ. Health Serv., Communicable Dis. Center, San Francisco, Calif.) MODIFICATION OF A LIVE-CATCH RODENT TRAP TO PROTECT SMALL MAMMALS. J. Mamm. 38(4): 531-533, 1 fig. Nov. 1957.

Diagrams show how to modify Young's Trap Model 15A by addition of an enclosed retreat box and a dry bait retainer. "The extra effort to make these changes is more than repaid by the increased capture of uninjured mammals."

Louch, Charles D. (Lake For. Coll., Lake Forest, Ill.) ADRENOCORTICAL ACTIVITY IN TWO MEADOW VOLE POPULATIONS. J. Mamm. 39(1): 109-116, 2 graphs. Feb. 1958.

Relationship of population density to adrenocortical activity was studied in 2 wild populations of Microtus pennsylvanicus. Criteria of adrenocortical activity were blood eosinophil levels and adrenal weight. The Mud Lake area had high population in fall of 1952 and low population during rest of study. Hammersley's Marsh area had low to normal population throughout study (Nov. 1952-Nov. 1953). Drought in fall of 1952 appeared to increase adrenocortical activity in both areas. High population density at Mud Lake appeared to increase adrenocortical activity to higher levels than those at Hammersley's Marsh. "It is suggested that the drought conditions and the high population density present in the Mud Lake Area in the fall of 1952 may have had a cumulative effect on adrenocortical activity resulting in significantly higher adrenal weights and lower eosinophil counts than in the Hammersley's Marsh Area at that time. The data indicate that high population density is a stress factor eliciting increased adrenocortical activity, as suggested by Christian (1950)."

Murray, Keith F. (Calif. Dept. Pub. Health, Berkeley.) SOME PROBLEMS OF APPLIED SMALL MAMMAL SAMPLING IN WESTERN NORTH AMERICA. J. Mamm. 38(4): 441-451, 2 figs. Nov. 1957.

Results of live-trapping small mammals by use of parallel lines, with the lines running through different habitats. Habitat differences are tabulated, and travel of individuals between lines is analysed. Author discusses the difficulty of sampling mixed habitats by standard procedures and emphasizes the need for new techniques. See also WR 89: 24.--L. F. Stickel.

Pedersen, Carsten. (Danish Game Res. Sta., Kalø.) CYCLES IN DANISH VOLE POPULATIONS. Danish Rev. Game Biol. 3(2): 1-18, 3 figs. 1957.

Author used various forestry sources to obtain data on peak years for small rodents, especially field voles. Data extend back to 1875 but are best for 1910-53. Marked fluctuations appeared, often at 3-year intervals, but the best data did not show any true periodicity. The author is inclined to feel that the fluctuations may be ascribed to chance. Years of maxima tended to be the same in North Zealand and South Jutland, but there were also marked deviations. Climate is uniform enough over Denmark that the author would have expected better synchronization of maxima if climate were the sole determining factor. The

author's curve for small rodent populations did not compare well with Andersen's curve for hare populations; if climate governs hare populations, as Andersen postulated, different factors, climatic or otherwise, must affect small rodent populations. The author's data for 1910-53 are tabulated for use of other analysts.

Pruitt, Wm. O., Jr., and Charles V. Lucier. (Box 282, College, Alaska.) ON THE RELATIVE EFFICIENCY OF TWO KINDS OF TRAPS. J. Mamm. 39(1): 157. Feb. 1958.
Two kinds of snap traps, Museum Specials and Schuyler Size 3 "Mouse Killers," were alternated on the same plots. Museum Specials caught 10 Clethrionomys rutilus, 10 Microtus miurus, and no Microtus oeconomus. The Schuyler traps caught only 6 C. rutilus, and only 5 M. miurus, but 14 M. oeconomus. Differences are of questionable significance for C. rutilus and M. miurus, but are highly significant for M. oeconomus.

Reichstein, H. ZUR DYNAMIK DER SEXUALPROPORTION BIE DER FELDMAUS, MICROTUS ARVALIS (PALLAS). Z. Säugetierk. 21(3/4): 184-191. Feb. 1957. [From J. Mamm. 38(4).]
In German.

Spencer, Donald A., compiler. PRELIMINARY INVESTIGATIONS OF THE NORTHWESTERN MICROTUS IRRUPTION. US F&WS, Denver Wildl. Res. Lab. (Bldg. 45, Fed. Center, Denver 2, Colo.), Spec. Rep. 13 p., mimeo. Mar. 1958.
Serious irruption of Microtus montanus occurred in 5-state area of nw. U. S. in winter of 1957-58. It represented peak of 4-year cycle and followed exceptionally good plant-growing season. Population peaked about Nov. 1, and breeding then ceased. At peak, numbers may have reached 3,000 per acre. In late Jan., 200-300 per acre occurred in various areas. Sex ratios were not unbalanced in Jan., contrary to reports of certain other Microtus studies. Lack of cover in crop fields caused Microtus to burrow extensively. As many as 23,000 burrow openings per acre were counted in Jan., but not all were in use. Extensive burrowing in banks of irrigation ditches caused severe problem. Mice caused serious losses of grain and potato crops. Mice concentrated in uncultivated areas and hay fields after farmers plowed other fields. They girdled range shrubs. Standard poison baits, 1% zinc phosphide and 0.5% strychnine, gave good kills when applied by spot baiting, but not when broadcast by machine. Simply increasing the amount did not help. Author recommends use of these poisons only by spot baiting. When second treatment of same area is needed, he recommends using another poison and a different grain bait. This report is based on work of several study teams. It provides facts about population investigations, foods and food consumption of the mice, numbers of burrows, numbers of nests, results of poisoning trials, sex ratios, sizes of last litters (from placental scars), numbers of mice per nest (av. 3.3), and travels of mice.

van Wijngaarden, A. DE PERIODICITEIT IN DE POPULATIEMAXIMA VAN DE VELDMUIS, MICROTUS ARVALIS PALLAS, IN NEDERLAND, 1806-1956. Vakblad voor Biologen 37(4): 1-8 (reprint). Apr. 1957. [From J. Mamm. 39(1).]

Woods, J. W. THE EFFECTS OF ACUTE STRESS AND OF ACTH UPON ASCORBIC ACID AND LIPID CONTENT OF THE ADRENAL GLANDS OF WILD RATS. J. Physiol. 135(2): 390-399. Feb. 1957. [From J. Mamm. 39(1).]

Woods, J. W. THE EFFECTS OF LONG-TERM EXPOSURE TO COLD UPON ADRENAL WEIGHT AND ASCORBIC ACID CONTENT IN WILD AND DOMESTICATED NORWAY RATS. J. Physiol. 135(2): 384-389. Feb. 1957. [From J. Mamm. 39(1).]

## MAMMALS--PARASITES AND DISEASES

Bacon, Marion, Roma F. Bacon, and Charles H. Drake. (Coll. Med., U. Nebr., Omaha.) BACTERIAL INFECTIONS IN WILD RODENTS OF EASTERN AND CENTRAL WASHINGTON. J. Infect. Dis. 102(1): 5-13. Jan.-Feb. 1958.

Bacon, Marion, and Charles H. Drake. (Coll. Med., U. Nebr., Omaha.) COMPARATIVE SUSCEPTIBILITY OF VARIOUS SPECIES OF MICE NATIVE TO WASHINGTON TO INOCULATION WITH VIRULENT STRAINS OF PASTEURELLA PESTIS. J. Infect. Dis. 102(1): 14-22. Jan.-Feb. 1958.

Both Microtus and Peromyscus included some plague resistant and some plague-susceptible individuals. Perognathus seemed entirely susceptible. Peromyscus and Microtus may play an important role in maintaining plague in the enzootic condition; Perognathus probably cannot. Carnivorous habits may be important in transfer of plague infection among rodents.

Crook, Edward, and S. H. McNutt. (Cutter Labs., Berkeley, Calif.) EGG-ADAPTATION OF A STRAIN OF DISTEMPER VIRUS ISOLATED FROM A RACCOON. Am. J. Vet. Res. 19(70): 223-224. Jan. 1958.

Drummond, Roger O. (Entom. Res. Lab., P. O. Box 232, Kerrville, Texas.) ECTOPARASITIC ACARINA FROM SMALL MAMMALS OF THE PATUXENT REFUGE, BOWIE, MARYLAND. J. Parasit. 43(1): 50. Feb. 1957.

Lists mites and ticks taken from 279 small rodents and insectivores.

Grundmann, Albert W. (U. Utah, Salt Lake City.) NEMATODE PARASITES OF MAMMALS OF THE GREAT SALT LAKE DESERT OF UTAH. J. Parasit. 43(1): 105-112. Feb. 1957.

Twenty-three species of nematodes were recovered from 527 mammals of many groups. Seasonal fluctuations of parasitism and reasons for them are discussed.

Habermann, Robert T., Carlton M. Herman, and Fletcher P. Williams, Jr. (Natl. Cancer Inst., Bethesda, Md.) DISTEMPER IN RACCOONS AND FOXES SUSPECTED OF HAVING RABIES. J. Am. Vet. Med. Assn. 132(1): 31-35, 5 photos. Jan. 1, 1958.

"1) Twenty-one raccoons and 3 red foxes were collected from areas where suspected rabies occurred. All were found to be nonrabid. 2) Distemper was diagnosed in 14 of the 21 raccoons by demonstrating intracytoplasmic and intranuclear inclusions in the brain and visceral tissues. Two of the 3 foxes were considered to have distemper; the clinical signs were typical and mouse inoculation tests were negative for rabies. 3) Deaths of the other 7 raccoons were attributed to: leishmaniasis 1, gastritis 1, bronchopneumonia 1, parasitism 2, car injury 1; 1 showed no significant lesions. The death of 1 fox was attributed to parasitism. 4) Distemper may be a frequent cause of death in raccoons and foxes, in epizootics which simulate rabies."

Kartman, Leo, and Alva R. Kinney. (US Pub. Health Serv., San Francisco 18, Calif.) A RODENT-ECTOPARASITE-DISEASE SURVEY IN DEATH VALLEY NATIONAL MONUMENT, CALIFORNIA. J. Parasit. 43(4): 492-493, 1 map. Aug. 1957.

No disease and few ectoparasites were found. Shortage of water appeared to limit flea production.

Presnall, Clifford C. (US F&WS.) CONTROL DE LOS ANIMALES SILVESTRES VECTORES DE RABIA A LO LARGO DE LA FRONTERA MEXICANO-ESTADOUNIDENSE. Boletin de la Oficina Sanitaria Panamericana 43(2): 159-162. Aug. 1957.

Spanish with English summary. Six demonstrations of rabies control among wild animals in n. states of Mexico have shown that spread of rabies can be reduced and often stopped by decreasing the number of wildlife vectors without exterminating them, and that this can be done without great expense or danger to beneficial animals or man. They also saved large numbers of livestock from attack by predators. They demonstrated the need for control of wildlife before a rabies outbreak occurs. Control begun after an outbreak seldom prevents rapid spread of disease in heavy populations of predators. The work is therefore an economical form of health insurance.

Race, Stuart R. (N. Mex. A. & M. Coll., State Coll., N. M.) THE ANOPLURA OF NEW JERSEY. J. of N. Y. Ent. Soc. 64: 173-184. 1956 [1957].

Host and locality records for 18 spp. of sucking lice known to occur in N. J. and hypothetical list of 13 spp. Based on collection of 102,386 of these lice from 3,900 individual mammals.

Richards, Steve. (Vet. Sci. Dept., N. Dak. Agr. Coll., Fargo.) RABIES IN NORTH DAKOTA WILDLIFE. N. Dak. Outdoors 20(5): 4-5, 16, 2 photos. Nov. 1957.
Describes effects of rabies on behavior of various carnivores and discusses diagnosis in laboratory. Dumb and furious rabies are well known, but Richards also describes an intermediate form. Skunk is chief victim in N. Dak. Foxes are more resistant. Raccoons more than 2 years old seem to be highly resistant. Behavior of these species, as well as coyotes and badgers, is described as seen in rabid laboratory animals. Negri bodies are absent in about 20% of rabid animals; mouse inoculation is necessary. Absence of Negri bodies indicates that infection came from host of another species, according to author's work.

## SHREWS, MOLES, BATS

Constantine, Denny G. (P. O. Box 552, State College, N. M.) COLOR VARIATION AND MOLT IN TADARIDA BRASILIENSIS AND MYOTIS VELIFER. J. Mamm. 38(4): 461-466, 2 figs. Nov. 1957.
Both molt once a year, ♂♂ earlier than ♀♀. Pelages fade to a remarkable extent, and to different extents in different areas. Ammonia gas and water vapor may cause excessive fading in caves. Suggestions are given for considering this information in taxonomy.

Constantine, Denny G. (P. O. Box 552, State College, N. M.) AN AUTOMATIC BAT-COLLECTING DEVICE. J. Wildl. Mgt. 22(1): 17-22, 4 figs. Jan. 1958.
A method of trapping bats, employing fine taut wires arranged vertically and spaced 1 inch apart, was tested indoors and in the field. Bats were captured when they flew into wires, slid down them, and dropped into a receptacle. Myotis austroriparius was captured indoors when 0.006-inch wire was used. Lasiurus cinereus, L. seminolus, Tadarida brasiliensis cynocephala were captured by 0.012-inch wire. Antrozous pallidus was captured in the field with 0.012-inch wire, but Myotis californicus avoided capture. Traps with wire of this size were used in cave entrances and 13 spp. of bats were captured. Traps are described and illustrated.--Author.

Constantine, Denny G. (P. O. Box 552, State College, N. M.) ECOLOGICAL OBSERVATIONS ON LASIURINE BATS IN GEORGIA. J. Mamm. 39(1): 64-70, 1 graph. Feb. 1958.
Notes on Lasiurus seminolus, L. borealis, and Dasypterus floridanus: seasonal resting places, beginning of sociability in April, temperatures favorable to flight or torpidity, reproductive condition and injuries of certain individuals, occasional exposure of resting individuals to predation.

Dodgen, C. L., and F. R. Blood. ENERGY SOURCES IN THE BAT. Am. J. Physiol. 187(1): 151-154. Oct. 1956. [From J. Mamm. 39(1).]

Hoffmeister, Donald F. (U. of Ill., Urbana.) REVIEW OF THE LONG-NOSED BATS OF THE GENUS LEPTONYCTERIS. J. Mamm. 38(4): 454-461, 1 map. Nov. 1957.

Pucek, Zdzislaw. HISTOMORPHOLOGISCHE UNTERSUCHUNGEN ÜBER DIE WINTERDEPRESSION DES SCHÄDELS BEI SOREX L. UND NEOMYS KAUP. Ann. Univ. Mariae Curie-Sklodowska (Lublin), sec. C. 10(15): 399-428. Apr. 1957. [From J. Mamm. 39(1).]

Sulkin, S. E., P. H. Krutzsch, Craig Wallis, and Rae Allen. (U. Texas SW. Med. Sch., Dallas.) ROLE OF BROWN FAT IN PATHOGENESIS OF RABIES IN INSECTIVOROUS BATS (TADARIDA B. MEXICANA). Proc. Soc. Exp. Biol. & Med. 96(2): 461-464. Nov. 1957.
Summary: "1. Studies on the progression of peripherally inoculated rabies virus...suggest that the brown (hibernating) fat plays a significant role in the pathogenesis of rabies in this animal. 2. Brown fat may serve as a depot for the storage of virus in symptomless carriers of the rabies virus. 3. These studies provide another example of selective viral lipotropism."

Tarkowski, A. K. STUDIES ON REPRODUCTION AND PRENATAL MORTALITY OF THE COMMON SHREW (SOREX ARANEUS L.). PART II. REPRODUCTION UNDER NATURAL CONDITIONS. Ann. Univ. Mariae Curie-Sklodowska (Lublin), sec. C, 10(8): 177-244. Feb. 1957. [From J. Mamm. 38(4).]
In Polish with English summary.

Verme, Louis J. (Mich. Dept. Cons., Shingleton.) LOCALIZED VARIATION IN MASKED SHREW ABUNDANCE. J. Mamm. 39(1): 149-150. Feb. 1958.

Sorex cinereus was fairly common on 1 area logged for Thuja occidentalis but apparently absent from a similar area 3 mi. away. Habitat conditions, and results of snap-trapping shrews, are described for both areas.

## RABBITS AND PIKAS

Andersen, Johs. (Danish Game Res. Sta., Kalø.) STUDIES IN DANISH HARE-POPULATIONS. 1. POPULATION FLUCTUATIONS. Danish Rev. Game Biol. 3(2): 85-131, 10 figs. 1957.

Statistical analysis of 50-years' records for Lepus europaeus, 1902-52. Data consist of annual bag-records for 22 hunting districts, chiefly private estates. The kill represented is about 1% of national kill. The curve of kill-records is believed to represent national fluctuations of hares fairly well. "The graph can be decomposed into (1) a statistically significant linear, positive trend, (2) an element attributed to climate and contributing 40-50 per cent of the total variance, (3) an insignificant amount of autoregression, and (4) a residual variation caused by random sampling errors. It is probable that given more detailed climatic data it would be possible to account for a considerably larger proportion of the residual variation. Important climatic factors are (1) the monthly mean rainfall in June + July, (2) the monthly mean temperature during March-June (incl.) and/or the number of frost days in December-March (incl.). The hare-curve shows no intrinsically oscillatory behaviour. The appr. 3-year and still larger 9-year peaks can be accounted for by considering the climatic data as an essentially random series (COLE 1954), the 3-year peaks being caused by one of the climatic factors and the 9-year peaks by superposition of the two factors (low rainfall in June-July and high temperature during the spring). The present results will be further expanded in forthcoming publications."

Bourlière, F., editor. LES CONSÉQUENCES BIOLOGIQUES DUES A LA PRÉSENCE DE LA MYXOMATOSE. RAPPORTS ET COMPTES RENDUS DES DISCUSSIONS DU THÈME II DE LA SIXIÈME RÉUNION TECHNIQUE DE L'UNION INTERNATIONALE POUR LA CONSERVATION DE LA NATURE ET DE SES RESSOURCES / EDIMBOURG, 20-28 JUIN 1956. La Terre et la Vie (Paris) 103 (3/4): 123-291, 8 maps, 1 graph, 1 pl. July-Dec. 1956.

Important symposium. In English and French. The individual papers give much detailed information. The whole is a comprehensive picture of the biological effects of myxomatosis, and of the devastating dominance rabbits held over whole biotic communities. From summary of conference, by F. Bourlière (p. 123-136): "The effects of myxomatosis on the fauna and particularly on vegetation appear to be as spectacular as its action on wild rabbit populations. The abrupt reduction of the latter has not only made possible an increased yield from certain crops, but also the regeneration of seriously threatened forests and the reconstitution of plant associations whose very existence was endangered by the throngs of this animal. From the point of view of Nature Protection, and also of agriculture, it seems quite certain that the effects of myxomatosis, after all is said and done, are beneficial. On the other hand, extinction of the wild rabbit seems to be out of the question, and a probable state of equilibrium between parasite and host should lead to the stabilization of rabbit populations at a level less dangerous to the permanence of biotic communities than that which existed before the epidemic." Papers include: The origin and spread of myxomatosis, with particular reference to Great Britain, by Harry V. Thompson (p. 137-152); The ecological consequences of myxomatosis in Australia, by F. N. Ratcliffe (p. 153-166); L'epizootie de myxomatose en France chez le lapin de garenne (Oryctolagus cuniculus L.), by J. Giban, J. Barthelemy, and J. Aubry (p. 167-178, 5 maps, Eng. summ.); Repercussion de la myxomatose sur les populations de lapin de garenne en France, by J. Giban (p. 179-188, Eng. summ.); La Myxomatose en Belgique, by B. Willems and P. Schyns (p. 189-199, graph); The spread of myxomatosis in the Netherlands, (p. 200-207, map); Myxomatosis in Germany, by Harry Frank (p. 208-210, map); The observed effects of myxomatosis on rabbit populations and behaviour and on wild life generally, by R. M. Lockley (p. 211-219); Rabbits, buzzards and hares. Two studies on the indirect effects of myxomatosis, by N. W. Moore (p. 220-225); Influence de l'epidemie de myxomatose sur la flore Francaise, by A. Morel (p. 226-238, Eng. summ.); Biological effects of the spread of myxomatosis among rabbits, by A. S. Thomas (p. 239-242 + 1 pl.); The after-effects on the flora and vegetation of myxomatosis in the Netherlands, by Chr. C. van Leeuwen (p. 243-247); Myxomatosis in rabbits, by Agr. & For. Div. of FAO (p. 248-252).--L. F. Stickel.

Bronson, F. H., and O. W. Tiemeier. (Kans. State Coll., Manhattan.) THE KANSAS JACKRABBIT. Kans. Fish & Game 15(3): 3-5, 2 photos. Jan. 1958.

Apparently based on parts of Bronson's thesis, an abstract of which appeared in WR 90, p. 33. The present article summarizes data on weights, crop damage, breeding season, productivity, and causes of increases in population. Authors believe that the black-tailed jackrabbit is an animal weed whose survival is increased by drought and overgrazing. Also, drought tends to cause migrations and concentrations. Crop damage results and the hares seem even more abundant than they really are. Relief of drought is followed by dispersal of hares and great reduction in crop damage. "It is probable that any future large-scale management of these animals will be based upon sound conservative land usage, if feasible..."

Carrick, R. (Wildl. Surv. Sec., C.S.I.R.O., Canberra.) WHAT IS THE BEST FREE-FEEDING SYSTEM FOR FURROW-POISONING THE RABBIT? C.S.I.R.O. Wildl. Res. 2 (2): 78-84. Oct. 1957.

Reactions of Oryctolagus to furrows and free-feeding were observed in enclosures. Data on behavior of individuals was obtained by labelling bait with $^{131}I$ and use of spotlights at night. "Many rabbits move and feed within a restricted area, which may not be crossed by the furrow. The problem of furrow-poisoning is one of time--to get the maximum number of individuals to take bait without undue build-up of appetite in those which first do so. It is recommended that the furrow be left empty for several days and that intermittent free-feeding should follow at similar intervals. Poisoning should continue for several nights. It is suggested that reduction of rabbit numbers to near-eradication level could be achieved by repetitive use of this method of control at short intervals."

Dell, Joseph. (Orchard St., Delmar, N. Y.) AN EVALUATION OF THE RESULTS OF STOCKING IMPORTED COTTONTAIL RABBITS IN NEW YORK STATE. N. Y. Fish & Game J. 4(2): 121-149, 4 figs. July 1957 [Jan. 1958].

In 1939, the N. Y. Cons. Dept. stopped importing rabbits for release. After 1942, sportsmen's clubs were permitted to import rabbits and soon began pressing for importations by state. To test such stocking, state set up 12 study areas and released 2,234 cottontails in winter of 1947-48 and 4,438 in next winter. Of rabbits released during hunting season, hunters of 4 areas bagged 8.6%. Live trapping of 2 areas indicated survival to breeding season of less than 13%. Cost of each rabbit shot or living until breeding season was $6.98. "Studies of post-season releases showed that the increase in population on two stocked units of an area was not significantly different from that on an unstocked unit after one full breeding season. Thus it was demonstrated that lack of breeders was not a factor limiting rabbit abundance. It was concluded that release of imported rabbits, either during or after the open season, is decidedly uneconomical and that very little improvement in hunting opportunity can be expected for the money spent."

Dell, Joseph. (Orchard St., Delmar, N. Y.) WANT MORE RABBITS? HERE'S HOW. N. Y. State Cons. 12(3): 20-22, 38, 12 figs. Dec.-Jan. 1957-58.

How to improve winter habitat for cottontails. Some of the techniques are most suitable for intensively managed lands such as beagle-trial areas. Emphasis should be on scattered units of good cover near winter food. Rabbits seek heavy shelter when there is deep snow, high winds, or temperatures below 20°F. Brushpiles yield both food and cover. Orchard trimmings are fine. Piles should be at least 7 ft. wide and 5 ft. high. Basal layer should be of heavy pieces laid parallel. Hardwood is best. Good living pile is made of small trees half-cut to a common center. Stonepiles built with cavities and entrances are good, especially with multiflora around entrances. Artificial dens can be made of scrap wood, tile, or cement. They should be on well-drained sites, should be buried, and should have 2 entrances. Conifer clumps can provide cover. Nearby hardwoods can be cut to yield sprout food. Multiflora in clumps or rows gives food and cover. Large or medium sized trees have no rabbit value; they should be cut for timber and brushpiles and sprouts. This can be done at least along borders. Tips and young bark of staghorn sumac are good food. Staghorn stalks more than 3 years old are little good; they should be broken or cut back so tips will be available and sprouts will form later.

Dell, Joseph. (Orchard St., Delmar, N. Y.) RABBIT SEASON. N. Y. State Cons. 12(4): 12-13, 2 figs. Feb.-Mar. 1958.

N. Y. has a long season on cottontails--Oct.-Feb. Is it too long? Research doesn't indicate that it is. "Rabbits taken by hunters are primarily young of the year; a surplus breeder population is not necessary for, nor a guarantee of a high Fall abundance; a natural reduction in rabbit numbers occurs throughout the year--with or without hunting; the hunting season which includes February does not overlap the normal breeding season; and rabbit abundance over much of its range in the State rose to a peak recently after the long season was instituted." Rabbits are vulnerable to severe winter weather. They tend to stay under cover when temperature is below 20°F. Late winter is a critical period, for cover is beaten down, full of snow, or frozen up; food is scarce. Surplus should be harvested before this time. Hunting takes a predominance of ♂♂, for ♀♀ are more apt to hole up during daytime in bad weather. Study of hunted and unhunted area showed that Spring population was higher in unhunted area, but that Fall populations were about equal. Stocking of rabbits had no effect on numbers in Fall. Other studies revealed that 3 out of 4 rabbits shot are young of year. Nevertheless, more than 2/3 of rabbits born each year are lost before hunting season. Fewer breeders would not mean lower Fall population, but simply better survival of young. In N. Y., breeding is very rare in Feb. and reaches early peak only in middle of March, later in late springs.

Dodds, Donald G. (Dept. Mines & Resources, St. John's, Nfld.) SNOWSHOE HARE RESEARCH IN NEWFOUNDLAND. Presented at 1958 conf. NE. Sec. Wildl. Soc. et al. 7 p., mimeo. Jan. 1958.

Hares were introduced about 100 years ago. They became extremely abundant at times, but have been scarce in most areas since 1949. The snowshoe hare is extremely important as a food source: hundreds of thousands are snared in good years. Few are shot. Hares inhabit the whole island except the barrens, where L. arcticus lives. In the present study, humeri are purchased at 5¢ each through schools. Thousands are thus obtained. Young:adult ratios differ between areas and between years. Reasons are being sought. The population of a small island is being killed off to gain true age and sex ratios. The epiphyseal groove of the humerus becomes indiscernable at age of about 7 months. This was determined from animals of known age. Captives av. 3.1 per litter. Gestation period for 7 litters was 34-38 days, av. 37. A disease that causes white flecks on internal organs may be reason for die-offs of young in fall and early winter. It may explain some population declines. 79% of hares have cysticerci. Many have stomach worms (Obeliscoides cuniculi?). Lynxes and ermines are currently numerous. Ermine population reached peak soon after that of meadow voles. Moose retard regrowth on cutovers enough to prevent heavy use by hares for several years. Hares encounter no moose competition in spruce and balsam sites.

Dunnet, G. M. (Wildl. Surv. Sec., C.S.I.R.O., Canberra.) NOTES ON EMERGENCE BEHAVIOUR OF THE RABBIT, ORYCTOLAGUS CUNICULUS (L.), AND ITS BEARING ON THE VALIDITY OF SIGHT COUNTS FOR POPULATION ESTIMATES. C.S.I.R.O. Wildl. Res. 2(2): 85-89, 4 graphs. Oct. 1957.

Summary: "Observation indicated a wide variation in the times of emergence... from adjacent warrens. Disturbance by avian predators and casual interference by humans had only a temporary effect on emergence but prolonged shooting and gin-trapping caused the rabbits to emerge later, and readjustment to normal behaviour took about 3 months. These variables must be taken into consideration in the use of sight counts for population estimates."

Dunnet, G. M. (Wildl. Surv. Sec., C.S.I.R.O., Canberra.) A TEST OF THE RECAPTURE METHOD OF ESTIMATING THE NUMBER OF RABBITS, ORYCTOLAGUS CUNICULUS (L.), IN A WARREN. C.S.I.R.O. Wildl. Res. 2(2): 90-100. Oct. 1957.

From summary: Method was tested in a single warren. "Infra-adult rabbits were trapped in box traps and smeuses and marked conspicuously and individually with numbered plastic disks. A series of sample counts of marked and unmarked rabbits was obtained by observation on each sampling occasion, and as these counts are not serially independent their treatment is discussed in detail. A test showed no significant difference between marked and unmarked rabbits in their tendency to disperse from the warren. An additional method of estimating population size from recapture data was used and confirmed the estimates from the usual recapture technique. Six estimates during the same week had a range of 124-167 infra-adult rabbits, and digging out the warren indicated that about 122 were present."

Eadie, W. Robert. (Cornell U., Ithaca, N. Y.) RABBIT TROUBLE. N. Y. State Cons. 12(2): 22, 2 photos. Oct.-Nov. 1957.
Recommended repellents and exclosures to protect woody plants and gardens from cottontails.

Fox, Lester. (Soil Cons. Serv., Upper Darby, Pa.) SPORTSMEN ARE SPORT-MAKERS. Soil Cons. 23(8): 159-161, 3 photos. Mar. 1958.
Members of the Hancock Co. Sportsmen's Assn., W. Va., had no place to train their beagles. With advice of game men, they bought an eroded 167-acre farm and set to work on it. They cut and piled some 50 acres of brush and trees. They planted 5,000 trees and shrubs. They built 3 fishing ponds. They disked, limed, and fertilized a strip a mile long and 25 ft. wide. They planted the strip to annual grains for wildlife food one year and planted the strip to grass next year. Between strips of grains and grasses they planted perennial shrubs of value to wildlife. Eventually, about 50,000 trees and shrubs were planted and more brush was cut and piled. Corn, wheat, and barley were grown on a crop-sharing plan on a small scale. By 1955 the club cleared a small profit on the farm. Planted Christmas trees were reaching marketable size. All the while, the farm served as a conservation education and demonstration center. What about the rabbits? Used only for beagle trials and not shot, they are believed to have increased from 116 in spring of 1954 to 187 in spring of 1956; from 202 in fall of 1954 to 256 in fall of 1955.

Gleeson, J. P., and F. S. Maguire. (Defence Standards Labs., Maribyrnong, Victoria.) A TOXICITY STUDY OF RABBIT FUMIGANTS. C.S.I.R.O. Wildl. Res. 2(2): 71-77, 2 figs. Oct. 1957.
Summary: "Using chloropicrin as a reference substance and a 7-day observation period, the comparative toxicity to the Australian wild rabbit, Oryctolagus cuniculus (L.), of 15 other gasses has been assessed. With the possible exception of phosgene, hydrogen cyanide was the most toxic. Arsine, cyanogen chloride, and dichloroacetone were of the same degree of toxicity as chloropicrin. The remaining substances were found to be comparatively non-toxic and were not investigated in detail. There are indications that there is a threshold concentration of chloropicrin below which the median lethal dosage increases rapidly. The practical application of these results is briefly discussed."

Höglund, Nils H. THE REPRODUCTION OF THE SCANDINAVIAN MOUNTAIN-HARE (LEPUS T. TIMIDUS LIN.) IN CAPTIVITY. Viltrevy 1(3): 267-282, 10 figs. Dec. 1957.
In Swedish with long English summary. Detailed report of mating behavior, male reproductive organ, gestation period, birth, behavior of new-born, age of ♀♀ at first breeding, number of litters, size of litters, and relation of breeding to age of ♀♀. Gestation period was 47-55 days, av. 50.3 days. Many 1-year-old ♀♀ produced only 1 litter. "Well developed and healthy young females as a rule breed the following spring. The greatest number of litters per individual was obtained from females between 2 and 7 years of age." Number of litters and size of litters decreased as age of ♀♀ increased. Spring litters contained 1-5 young, av. 2.15. Summer litters contained 1-8 young, av. 3.24.

Irving, Laurence, John Krog, Hildur Krog, and Mildred Monson. (Arctic Health Res. Center, Anchorage, Alaska.) METABOLISM OF VARYING HARE IN WINTER. J. Mamm. 38(4): 527-529, 1 graph. Nov. 1957.

Koskimies, Jukka. (Game Res. Inst., Unionink. 45B, Helsinki, Finland.) STUDIES ON THE WINTER HABITAT PREFERENCES OF THE SNOW HARE, LEPUS TIMIDUS L. Arch. Soc. 'Vanamo' 12(1): 29-37, 3 figs. 1957.
In English. Relative abundance of tracks in winter was studied in various forest habitats in Finland. Bogs of "korpi" type [Vaccinium, Salix, Picea] were favored habitat, probably because of good food and shelter. Of drier forests, the richer types [Oxalis-Myrtillus and Myrtillus] were favored. Abundance of tracks was in direct relation to proportion of spruce and inverse to pine. Proportion of birch had no clear significance. Combination of spruce-birch was best. Winter habitat declined in value with age of tree stand. Certain principles of habitat selection in animals are discussed.

Lajos, Csik. METABOLISM INVESTIGATIONS ON DOMESTICATED AND WILD RABBITS. Ann. Inst. Biol. (Tihany) Hungaricae Acad. Sci. 24: 3-10. 1957.
Hungarian with German summary.

Lane, Richard A. A STUDY OF A COTTONTAIL POPULATION ON A 92-ACRE FARM AREA IN CENTRE COUNTY, PENNSYLVANIA. M. S. thesis, Pa. State U. 1954.--P. F. English.

Lang, Lincoln McC. A SURVEY OF THREE COTTONTAIL RABBIT ENVIRONMENTS IN CENTRAL PENNSYLVANIA. M. S. thesis, Pa. State U. 1956.--P. F. English.

Lechleitner, R. R. (Colo. State U., Fort Collins.) REINGESTION IN THE BLACK-TAILED JACK RABBIT. J. Mamm. 38(4): 481-485, 1 graph. Nov. 1957.
Reingestion of soft feces is a normal part of feeding biology. The soft feces are formed in the caecum and swallowed during daylight hours, when hares are mainly inactive. No seasonal trends were detected. Reingestion appears to be normal in lagomorphs in general and may occur in most rodents.

Libby, Wilbur L. (U. Alaska, College.) A BETTER SNOWSHOE HARE LIVE TRAP. J. Wildl. Mgt. 21(4): 452, 1 photo. Oct. 1957.
A wood-frame, wire-mesh trap with spring-closed doors is described and illustrated.--John L. Buckley.

Lowe, Charles E. (U. Ga., Athens.) ECOLOGY OF THE SWAMP RABBIT IN GEORGIA. J. Mamm. 39(1): 116-127, 2 maps. Feb. 1958.
"I. Behavior, home range and population density of swamp rabbits, Sylvilagus aquaticus, were investigated on a 131-acre study area, and specimens were collected over a wide area to clarify relationships with S. floridanus and S. palustris. 2. The swamp rabbit is more elusive and harder to observe and trap than the common cottontail; the two species occupy different habitats with little overlap. The use of trained dogs proved the best technique for observation of home range and behavior. 3. Home ranges averaged about 19 acres and density was about 5.6 per 100 acres during fall and winter. All home ranges contained water which was freely utilized for escape. 4. The breeding season extends at least from March to September. Litters averaged 2.6 (2.9 for cottontails). Only one nest was found. 5. Weights, body and skull measurements are tabulated. Differences between sexes were not significant for any measurement. Weights averaged 1960 grams (1140 for cottontails collected from same region) with maximum of 2385 (5.4 lbs.). 6. The Fall Line marks the approximate boundary between the range of aquaticus and palustris in eastern but not in western Georgia. One but not both of these species was found in all localities investigated. However, upper coastal plain palustris specimens were somewhat intermediate in color and size between aquaticus and palustris from the coastal strip pointing up the need for further study of relationships between these very closely related species."

McDonough, James J., and Herbert K. Maxfield. (Mass. Div. Game, Westboro.) RESULTS OF COTTONTAIL RABBIT MANAGEMENT IN A POLE STAGE FOREST TYPE IN CENTRAL MASSACHUSETTS. Presented at 1958 conf. NE. Sec. Wildl. Soc. et al. 11 + 6 p. maps & tables, mimeo. Jan. 1958.
A highly significant paper that makes one wonder how often wildlife workers have mistaken game concentrations on managed plots for actual population increases. In this study, a rough, dry, sterile, wooded area of 292 acres was experimentally improved for rabbits. Different sections were treated in different ways: food patches, liming, fertilizing, multiflora rose planting, conifer planting, patch cutting, improvement cutting, and strip cutting. Populations were followed by box trapping, 1951-55, on treated and control areas. Rabbits appeared to increase only in the strip-cut area, and there the dominant rabbit became S. floridanus instead of S. transitionalis. On the other hand, dropping and browse counts revealed that rabbits used food patches, limed areas, and fertilized areas much more than they did control areas. [Studies based only on use might therefore lead to very mistaken conclusions about increase.] "It has not been determined whether or not the correct management was applied to this area. Therefore, the negative results of this investigation should not be construed as indicative of rabbit management being impractical in all covers, but applies only in covers comparable to the study area."

Myers, K. (Wildl. Surv. Sec., C.S.I.R.O., Field Sta., Albury, N.S.W.) SOME OBSERVATIONS ON THE USE OF SIGHT COUNTS IN ESTIMATING POPULATIONS OF THE RABBIT, ORYCTOLAGUS CUNICULUS (L.). C.S.I.R.O. Wildl. Res. 2(2): 170-172. Oct. 1957.

Sight counts are relatively reliable for estimating populations of favorably situated warrens that have non-breeding populations of small to medium size. Results must be interpreted with great caution.

Rosasco, M. Edwin. (Ecol. Res., U. Utah, Dugway.) SEASONAL ABUNDANCE OF THE TICK DERMACENTOR PARUMAPERTUS ON THE BLACK-TAILED JACK RABBIT, WITH NOTES ON OTHER ECTOPARASITES. J. Mamm. 38(4): 485-490, 2 graphs. Nov. 1957.

Rowley, Ian. (Wildl. Surv. Sec., C.S.I.R.O., Canberra.) OBSERVATIONS ON EVENING RABBIT ACTIVITY IN RELATION TO WEATHER AND SUNSET. C.S.I.R.O. Wildl. Res. 2(2): 168-169, 1 graph. Oct. 1957.

Study of Oryctolagus in Tasmania. Neither sunshine nor temperature seemed to affect onset of evening activity. "Thus evening activity appears to be subject to both long-term (seasonal) and short-term (weather and disturbance) fluctuations. Of the latter, those due to wind and rain are the most common. Disturbances, such as heavy predation or bad weather the previous night, may affect activity the following evening."

Seiskari, Pertti. THE WINTER-TIME HOME RANGE OF THE SNOW HARE. Suomen Riista 11: 101-108, 3 figs. 1957.

In Finnish with English summary on separate mimeo. sheet. Four hares, presumably pen-reared, were toe-marked, released, and tracked in snow. One disappeared, 1 moved away, 1 remained within 3 km., and 1 within 0.5 km. Pen-reared hares adapted quickly after release and behaved like wild hares. Propagation is considered satisfactory for restoration. In midwinter, hares moved little, especially after a snowfall. Ranges widened when mating season began. Abundance of foxes did not cause movement from area. Most popular haunts were logged areas with good supply of crowns of deciduous trees, mainly birch, on ground.

Shanks, P. L., R. M. Allan, and P. W. Brown. MYXOMATOSIS IN RABBITS WITH SPECIAL REFERENCE TO THE NORTH OF SCOTLAND. Trans. Roy. Highland & Agr. Soc. Scotland, n. s. 1: 64-79. 1956 [1957]. [From Biol. Abs. 32(1).]

The history of this disease is followed from its first description in 1897 in Montevideo and the consequent attempts in various countries to use the disease as a means of exterminating the rabbit. The disease and the part played by insect vectors are described; the latter, where they are permanent parasites of the rabbit, become extinct when the disease spreads throughout the rabbit population and this extinction acts as a check on the disease. The range and biology of these vectors is discussed in some detail and the course of the disease in the North of Scotland followed for three years. The natural reservoirs of the disease and its control are discussed.--C. E. Foister.

Waldbauer, Eugene C. A COTTONTAIL RABBIT POPULATION AND MORTALITY STUDY WITH EMPHASIS ON THE EFFECT OF WOODCHUCK DEN CLOSURE. M. S. thesis, Pa. State U. 1956.--P. F. English.

Watson, J. S. (D.S.I.R., Wellington, N. Z.) REPRODUCTION OF THE WILD RABBIT, ORYCTOLAGUS CUNICULUS (L.) IN HAWKE'S BAY, NEW ZEALAND. N. Z. J. Sci. & Technol., Ser. B. 38(5): 451-482, illus. 1957. [From long author's abstract in Biol. Abs. 31(12).]

Based on examination of more than 5000 rabbits through 2 years. Detailed account of annual cycle in weight of testis, age at sexual maturity, time of breeding season, number of ova and its correlation with weight and age, loss of ova, loss of embryos, size of litters, annual production per ♀, sex ratios, weights, population structure throughout year, comparative population structure in different populations.

Watt, Alex. S. (U. Cambridge, Eng.). THE EFFECT OF EXCLUDING RABBITS FROM GRASSLAND B (MESOBROMETUM) IN BRECKLAND. J. Ecol. 45(3): 861-878, 3 figs. Nov. 1957.

Botanical comparisons of British areas protected from grazing by the European rabbit with those subject to rabbit grazing.

Williams, Thomas R. (Colo. State U., Ft. Collins.) MARTEN AND HAWK HARASS SNOWSHOE HARE. J. Mamm. 38(4): 517-518. Nov. 1957.
Escape behavior of hare when menaced by both marten and red-tailed hawk.

## RODENTS--MISCELLANEOUS

Allred, Dorald M., and Ernest J. Roscoe. (Brig. Young U., Provo, Utah.) PARASITIC MITES IN DESERT WOOD RAT NESTS WITH NOTES ON FREE-LIVING FORMS. Trans. Am. Micro. Soc. 76(4): 389-403, 7 figs. Oct. 1957.

Chitty, Helen. (Oxford U.) THE OESTROUS CYCLE AND GESTATION PERIOD IN THE LACTATING FIELD VOLE, MICROTUS AGRESTIS. J. Endocrinol. 15(3): 279-283. 1957. [From Biol. Abs. 32(2).]
A vaginal estrous cycle resembling that of the deer mouse, Peromyscus maniculatus, but of only 3-4 days' duration, was observed in lactating M. agrestis which had been isolated for 3-4 days before their litters were due. Conception occurred when mating was permitted at any of these periods of vaginal estrus. The interval between copulation and the resultant parturition never exceeded the normal gestation period for non-lactating females.--Author.

Egoscue, Harold J. (Ecol. Res., U. Utah, Dugway.) THE DESERT WOODRAT: A LABORATORY COLONY. J. Mamm. 38(4): 472-481, 1 fig. Nov. 1957.
Rearing methods, reproduction, and other life history data for Neotoma lepida.

Fitch, Henry S. (U. Kans., Lawrence.) ASPECTS OF REPRODUCTION AND DEVELOPMENT IN THE PRAIRIE VOLE (MICROTUS OCHROGASTER). U. Kans. Publ., Mus. Nat. Hist., 10(4): 129-161, 8 figs. Dec. 1957.
First published results of 6 years' intensive study of vole populations by live trapping and laboratory observations. Prairie voles were non-territorial and somewhat social. Females in breeding condition varied between 1/4 and 3/4 of total population; the proportion declined below 1/4 only during severe summer drought. There was some breeding decline in cold weather. Highest pregnancy rate came in late spring and early summer. Gestation was 21 days or less; 3 was the most frequent number of young. Larger and older females averaged more young per litter; average size of young was greater in small litters. Details of growth and behavior of young are given. Growth was approximately 2mm. per day in voles less than 2 weeks old, 1/4 mm. per day in subadults. Some females became pregnant at approximately 1 month of age, but most were several weeks older.--L. F. Stickel.

Frank, Fritz. REPRODUCTION POTENTIAL OF MICROTUS ARVALIS--PEAK PRODUCTION AMONG MAMMALS. Z. Säugetierk. 21(3/4): 176-181. Feb. 1957. [From J. Mamm. 38 (4).]
In German.

Golley, Frank B. (Mich. State U., E. Lansing.) DISTRIBUTION OF PORCUPINE IN UPPER MICHIGAN. J. Mamm. 38(4): 526-527. Nov. 1957.
Data on forest damage done, relative abundance in various forest types, and approximate population density.

Hanson, Wm. R. (Ill. Nat. Hist. Surv., Urbana.) DENSITY OF WOOD RAT HOUSES IN ARIZONA CHAPARRAL. Ecology 38(4): 650. Oct. 1957.
Occupied houses of Neotoma albigula near Prescott av. 5.1 per acre. Wood rats were eating much bark of Rhus trilobata and thus helping to control this shrub, which is not commonly eaten by deer or cattle and hence tends to increase at expense of other plants.

Howell, J. Franklin. (Ecol. Res., U. Utah, Salt Lake City.) FLEAS ASSOCIATED WITH NESTS OF THE DESERT WOOD RAT. J. Parasit. 43(5): 566-573, 2 graphs. Oct. 1957.

Jameson, E. W., Jr. (U. Calif., Davis.) THE COST AND EFFECTIVENESS OF CONTROLLING MICROTUS BY ZINC PHOSPHIDE. J. Wildl. Mgt. 22(1): 100-103. Jan. 1958.

Studies were made of 6 trials of poisoning Microtus californicus using 1% zinc phosphide on rolled barley. Cost of treatment was $1.35 per acre. Mice were censused on 1-acre square plots immediately before and after poisoning. Populations were estimated from data obtained by live trapping for 5 days in each instance. In 4 trials the mean reduction was 95.5 ± 1.3%. In 2 trials, where the post-poisoning census was made 10 days after poisoning, the mean reduction was only 82.4 ± 2.2%; here the difference was caused by an invasion of mice into poisoned plots. It is suggested that a more rapid distribution of the bait will increase effectiveness and reduce cost.--Author.

Lidicker, Wm. Zander. AN ANALYSIS OF INTRASPECIFIC VARIATION IN THE KANGAROO RAT DIPODOMYS MERRIAMI MEARNS. Ph.D. thesis, U. Ill. 149 p. 1957. [From long abstract in Dissertation Abstracts 17(11).]

17 subspecies of Dipodomys merriami are diagnosed and discussed. A phylogenetic scheme is proposed for the genus as well as for D. insularis and the races of merriami. Geographic variation is described and analyzed in detail. Life history data are summarized. Populations of Dipodomys isolated since middle Pleistocene times have reached species distinctness; those isolated in the late Pleistocene seem to have nearly reached the species level; the least differentiated subspecies appear to have been isolated only 4000 to 6000 years.

Nichter, Richard. (3109 Reservoir Drive, Simi, Calif.) THE EFFECT OF VARIATION IN HUMIDITY AND WATER INTAKE ON ACTIVITY OF DIPODOMYS. J. Mamm. 38(4): 502-512. Nov. 1957.

Stoenner, Herbert G., and David B. Lackman. (Rocky Mtn. Lab., Hamilton, Mont.) A NEW SPECIES OF BRUCELLA ISOLATED FROM THE DESERT WOOD RAT, NEOTOMA LEPIDA THOMAS. Am. J. Vet. Res. 18(69): 947-951, 1 fig. Oct. 1957.

van Wijngaarden, A. INSECTICIDES OR BIOLOGICAL MEASURES IN THE CONTROL OF THE CONTINENTAL VOLE, MICROTUS ARVALIS (PALLAS), IN ORCHARDS. Mededelingen Directeur van de Tuinbouw 20: 269-374. 1957. [From J. Mamm. 39(1).]

In Dutch with English summary.

Voronov, A. G. METHODS OF FIELD STUDY OF THE FOOD RATION OF SMALL RODENTS. Biull. Moskovskovo Obshchestva Ispytatelei Prirody, Biol. 60(5): 21-30. 1955. [From Biol. Abs. 32(1). No abstract.]

In Russian.

Youngman, Phillip M. GEOGRAPHIC VARIATION IN THE POCKET GOPHER, THOMOMYS BOTTAE, IN COLORADO. U. Kans. Publ., Mus. Nat. Hist., 9(12): 363-385, 7 figs. Feb. 1958.

Characteristics, variation, and distribution of 6 races, 1 new.

## RATTUS AND MUS

Gruch, Werner. OLOFACTORY ABILITY OF RATTUS NORVEGICUS. Zool. Jahrb. 67(1): 65-80. 1957. [From J. Mamm. 38(4).]

In German.

Kahmann, Herman, and Bernd Haedrich. EINE UNTERSUCHUNG AN RATTUS RATTUS LINNAEUS 1758 (MAMM., ROD.) AUF DER INSEL KORSIKA. Zool. Anz. (Leipzig) 158 (11/12): 233-257. June 1957. [From J. Mamm. 39(1).]

## SCIURIDS

Atkeson, Thomas Z. (US F&WS, Wheeler Natl. Refuge, Decatur, Ala.) SHOTGUNS VERSUS RIFLES IN GRAY SQUIRREL HUNTING. J. Wildl. Mgt. 22(1): 99-100. Jan. 1958.

Data procured from 4,027 hunters during managed hunts held on the Wheeler Natl. Refuge show that 3,881 shotgun users hunted 1.6 hours for each gray squirrel bagged, fired 1.6 shots for each 1 bagged, and crippled 1 for each 6.6 taken.

By comparison, 146 hunters using .22 calibre rimfire rifles av. 2 hunting hours per squirrel taken, fired 3.8 shots per animal bagged, and crippled 1 for each 8.2 killed. In short, riflemen hunted longer for their game and fired more shots, but took their squirrels at a lower ammunition cost and possibly with less crippling.--Author.

Colin, Wayne, and George Kyle. (Ala. Dept. Cons.) AN ALABAMA SQUIRREL STUDY. Ala. Cons. 29(4): 24-27, 1 photo. Dec.-Jan. 1957-58.

Summary of 4-year study of gray squirrel by Colin. Peaks of litter production were in late winter and mid-summer. Av. litter size was 3. For every 100 squirrels shot in Oct., about 24 unborn or nursing young were lost. Same figure for Nov. was 12. Mast shortage in 1950 caused second litter of 1951 to be late. Mast shortage, extreme cold, etc., affected numbers of young. Dens made better homes than leaf nests; they were commoner in old stands. A variety of foods was needed, not just a few staples. Many animals, including hogs, were in competition for various foods. Number of squirrels varied directly with number of mast trees. Bot infestations were common, with highest infestation in late summer; there were few by Nov. Squirrels did not leave logged areas if enough food and den trees were left; they did leave if all merchantable timber was cut. Cripple loss on 1 area was about 1 to 9. Shotgun hunting was more successful than rifle hunting. Sound, conservative timber cutting is recommended; selective cut of 37% of merchantable timber by volume in bottomland hardwoods would not seriously reduce carrying capacity for squirrels. Fire and grazing were seriously adverse to squirrels. Good squirrel habitat had an av. of 5 dens and 12 mast trees per acre. Biologically, hunting season should be from Nov. through Dec., when incidence of pregnancy and bots is low. Present bag limit of 6 is acceptable. Population is influenced more by habitat than by hunting.

Creed, Wm. A. A STUDY OF THE NORTHERN GRAY SQUIRREL IN CAMERON COUNTY, PENNSYLVANIA, WITH EMPHASIS ON THE BEECH-BIRCH-MAPLE FOREST TYPE. M. S. thesis, Pa. State U. 171 p. 1957.--W. M. Sharp.

de Vos, Antoon, and Howard A. Merrill. (Ont. Agr. Coll., Guelph.) RESULTS OF A WOODCHUCK CONTROL EXPERIMENT. J. Wildl. Mgt. 21(4): 454-456, 2 figs. Oct. 1957.

Burrows on a 100-acre area were treated with gas cartridges in effort to eliminate Marmota monax on central field of 18.6 acres. More than 1/3 of burrows were opened by woodchucks within 2 weeks. Explanation is believed to be influx rather than survival. Cost to farmer of treatments made in this experiment is estimated at 35¢ per acre. "Considering the results obtained, it is doubtful that this investment is warranted except in areas of valuable truck crops, orchards, etc."

Fouch, Wm. R. (Mich. Dept. Cons., Lansing.) LONGEVITY RECORDS FOR THE FOX SQUIRREL. J. Mamm. 39(1): 154-155. Feb. 1958.

At the heavily hunted Rose Lake Wildl. Exp. Sta. near East Lansing, 1 squirrel lived 7.5 years, 1 at least 7.5 years, and 2 at least 6.5 years. Data are given on areas known to have been covered by these individuals, weights, and losses of ear tags and toe tags. Toe tags are lost frequently and occasionally cause loss of toes; their use has been discontinued.

Lampio, Teppo. MIGRATIONS OF SQUIRRELS. Suomen Riista 11: 48-58, 6 figs. 1957.

In Finnish with English summary on separate mimeo. sheet. Migrations of S. vulgaris in Finland have gone on for ages and are strong today. Squirrels travel great distances in one direction. They go in scattered groups at man's walking speed. They swim waterways, but many drown. Large parts of a population participate; in 1 study, the population after a migration was only 0.2% of that the year before. Most migrations are in autumn; they occur later in n. than in s. Finland. Movements are often westward, but in some areas may be toward s. or e. Spring migrations may represent, in part, return migrations. Different areas have migrations at different times. The mass movements usually, but not always occur when food conditions are poor. Most of the travelers are lost. Reasons for the movements still are not clear. The migrations are not of benefit to man, and man should harvest all the migrators he can. Unfortunately, pelts are seldom prime when migrations begin.

SCIURIDS--Continued

Layne, James N. (U. Fla., Gainesville.) HOMING BEHAVIOR OF CHIPMUNKS IN CENTRAL NEW YORK. J. Mamm. 38(4): 519-520. Nov. 1957.

Sharp, Ward M. (Pa. State U., U. Park.) AGING GRAY SQUIRRELS BY USE OF TAIL-PELAGE CHARACTERISTICS. J. Wildl. Mgt. 22(1): 29-34, 1 photo. Jan. 1958.
Age identification of Sciurus carolinensis has been based chiefly on sex organs of ♂♂ and size of nipples in ♀♀. Spring-littered young of the year have attained body weights and sex characters comparable to those of adults by mid-Nov. Aging at this season and later becomes complicated when conventional methods are used. But tail pelage reveals constant characters that separate juveniles from subadults, and subadults from adults. Upon reaching 16 to 18 months of age, gray squirrels have acquired tail-pelage characteristics typical of adults. This paper also discusses the 2 seasonal molts in the gray squirrel. --Author.

Vizoso, Monica Shorten. (Min. Agr., Hook Rise, Tolworth, Surbiton, Surrey, Eng.) SQUIRRELS IN ENGLAND, WALES AND SCOTLAND, 1955. J. Anim. Ecol. 26(2): 287-294, map. Nov. 1957.
Survey of distribution of introduced S. carolinensis and native S. vulgaris. The introduced gray squirrels have continued to spread but still do not occupy all areas. A reduction in their numbers was noticed in many areas in 1955.

BEAVER

Conaway, C. H. (Dept. Anat., U. Mo., Columbia.) THE UTERUS MASCULINUS OF CASTOR CANADENSIS. J. Mamm. 39(1): 97-108, 1 graph, 1 pl. Feb. 1958.
Variation and gross and microscopic anatomy of these vestiges. Effect of endocrine cycles on them is discussed.

Hinze, Gustav. METHODIK DER BIBERZUCHT. Zool. Garten (Leipzig) 23(1-3): 177-184. 1957. [From J. Mamm. 39(1).]
Methods of rearing beaver.

Pietsch, Lysle R. (Dept. Cons. & Ill. Nat. Hist. Surv., Urbana.) THE BEAVER IN ILLINOIS. Ill. Acad. Sci. Trans. 49: 193-201, 2 maps. 1956.
History, status, and recent catches. Beavers were nearly gone in Ill. by 1860 but some persisted until 1912. Introductions began in 1929. Some beavers came in from adjacent states. By 1950, when the population was about 3,565, there were beavers in 45 counties; by 1954 they were in 55 of the 102 counties of Ill. Complaints of crop and other damage led to transplanting. Trapping for fur began in 1951. Catch declined steadily from 659 in 1951 to 250 in 1955 although population was increasing. Reasons advanced for decline of catch are: 1. Beaver season is separate from that for other fur animals. 2. Trapping and handling is difficult. 3. Price of pelts is low, around $5.00.

Yeager, Lee E., and Wm. H. Rutherford. (Colo. State U., Fort Collins.) AN ECOLOGICAL BASIS FOR BEAVER MANAGEMENT IN THE ROCKY MOUNTAIN REGION. Trans. 22nd N. Am. Wildl. Conf. p. 269-299, 9 figs. 1957.
Overpopulations of beavers in the region cause serious destruction to mountain stream habitats in some localities. But balance between beaver numbers and range conditions has favorable effects on trout, waterfowl, aquatic fur animals, and other wildlife. An adequate harvest, difficult during the present era of low fur prices, is now the primary management objective in most of the West. Studies have led to development of beaver management plans based on carrying capacity of ranges as determined by physical characteristics of streams, quantity and quality of food, productivity, competition from livestock and big game, and beaver numbers. A practical beaver census technique has been developed for mountain range, primarily small streams. Harvest, attuned to sustained yield on areas suitable to beaver occupancy, is based on trends in beaver numbers and range condition, and may be set readily at levels giving increasing, static, or decreasing populations. Beavers in damage status are managed according to contingencies involved, usually by exhaustive trapping. Forms for recording field and management data, resulting in uniformity in procedure, are illustrated. Seasonal management jobs are given in sequence.--L. E. Yeager.

## MUSKRAT AND NUTRIA

Artimo, A. ON THE NATURAL NOURISHMENT OF MUSKRAT. Suomen Riista 11: 109-122, 3 photos. 1957.

In Finnish with English summary on separate mimeo. sheet. Plant and animal foods of wild muskrats in Finland are discussed. They are similar to those in Russia and in n. N. Am. Food consumption of captives was also studied. Old muskrats ate from 102-233 g. per day, i. e., 13-28% of body weight. Animal food constituted 1-15%. Corresponding values for young were 114-187 g., 23-37%, and 5-15%.

Cook, Arthur H. (N. Y. Cons. Dept.) CONTROL OF MUSKRAT BURROW DAMAGE IN EARTHEN DIKES. N. Y. Fish & Game J. 4(2): 213-218, 1 photo. July 1957 [Jan. 1958].

Vegetation-free areas adjacent to dikes could not be related to extent of burrow damage. Barriers of metallic netting were costly and deteriorated rapidly. Asbestos-cement sheets, used as vertical barriers within dikes, seemed to be the most practical of methods tried. Vertical barriers have the advantage of helping correct damage that has occurred. Under some conditions, berms were effective deterrents. Repelling muskrats by placing calcium carbide in holes in dam may be effective but temporary. Some dikes of heavy clay were not damaged for several years despite presence of substantial muskrat populations. "It was concluded that it should be both practical and economical to limit control measures to dikes in which muskrat damage had become serious."

Dunagan, T. T. (Arctic Aeromed. Lab., Fairbanks, Alaska.) HELMINTH PARASITES OF ALASKAN MUSKRATS. Trans. Amer. Micro. Soc. 76(3): 318-320. July 1957.

Erickson, Ralph H. MUSKRAT DAMAGE TO PENNSYLVANIA FARM PONDS WITH EMPHASIS ON INDIANA COUNTY. M. S. thesis, Pa. State U. 1956.--P. F. English.

Griffo, James V., Jr. (U. Fla., Gainesville.) THE STATUS OF THE NUTRIA IN FLORIDA. Quart. J. Fla. Acad. Sci. 20(3): 209-215, 1 map. 1957.

Nutria populations in Fla. arose from deliberate releases, escapes from nutria farms, and apparently by immigration. Feral nutria are now in w. and w.-central areas of Fla. The animals seem to be moving southward along the coast. There are at least 20 nutria farms scattered over Fla. and escapes occur at some of them. Some of these farms are near excellent nutria habitat. "A large statewide feral population of this species would be a potential threat to farm crops and waterfowl. Additional studies on the status of feral nutria and their effects on local ecology in Florida appear necessary."

Hoffmann, G., and L. Schröder. ANATOMY OF THE NUTRIA. 4. SKELETON OF UPPER AND LOWER LEG. Zool. Anzeiger 158(3/4): 44-49. Feb. 1957. [From J. Mamm. 38 (4).]

In German.

MacLennan, J. M., translator. TRANSLATIONS OF RUSSIAN GAME REPORTS. VOL. 2. (MUSKRAT, 1951-55). Can. Wildl. Serv., Ottawa. 1-224 p., graphs, proc. 1957. $1.00, paper, from Queen's Printer, Ottawa, Ont., Can.

[For Vol. 1 of this series, see WR'89: 32.] Eleven papers from the Russian annual, "Biology of Furbearers." 1. Increase of food production and improvement of nesting and shelter conditions in muskrat habitat in the Selenga delta (East Baikal district), by V. N. Vampiloff. 2. Better ways of trapping muskrats, by A. K. Okolovitch. 3. Tularemia in muskrats and measures to be taken against it, by E. S. Tcherkasski. 4. Significance of bitterns (Botaurus stellaris, L.) in muskrat management, by N. P. Lavroff. 5. Raising "black" muskrats, by N. P. Lavroff. 6. Internal and external parasites of muskrats, by N. P. Lavroff. 7. Acclimatization of muskrats in the Volga-Kama region, by D. I. Aspisoff. 8. Experiments in combined rearing of nutria and muskrats in the Kuban delta marshes, by M. P. Pavloff. 9. Acclimatization of muskrats in Leningrad province (releases and natural dispersal), by M. P. Altshul. 10. Acclimatization of muskrats in the Volga-Kama region: material on muskrat biology, by D. I. Aspisoff. 11. Fluctuations and forecasts of muskrat numbers, by N. P. Lavroff.

The Canadian Government deserves much praise for having these articles translated, reproduced, and offered to the public at such a reasonable price. It is to be hoped that all wildlife libraries and interested specialists will acquire copies.

Smith, Robert L. ECOLOGY OF THE MUSKRAT ON SPRING CREEK, CENTRE COUNTY, PENNSYLVANIA. M. S. thesis, Pa. State U. 1954.--P. F. English.

Stefan, Ehrlich, and Teresa Einszporn. WASHING OF FOOD BY NUTRIA. Ekologia Polska (Polska Akad. Nauk, Warszawa), Seria A, 5(1): 1-5. 1957. [Copy, with translation of summary, in US Dept. Interior Library.]

In Polish with German summary. Abstract from German summary: The authors submit that, in feeding, nutria wash rhizomes to remove soil contamination instead of merely moistening (dunking) them as previous literature on captive animals indicates. The conclusion is based on dropping analyses and observations under natural conditions. Analysis of 2,000 droppings revealed a complete lack of mineral contamination and showed that the epidermis of older rhizomes is removed. Observations show that rhizomes are washed and peeled, but stalks and leaves of land plants, water plants (emergents) and floating plants are not washed.--Van T. Harris.

## FUR ANIMALS, GENERAL

Beidleman, Richard G. (U. Colo., Boulder.) EARLY FUR RETURNS FROM THE PACIFIC NORTHWEST. J. Mamm. 39(1): 146-147. Feb. 1958.

Tabulation (by species) and discussion of annual fur records from Hudson's Bay Co. trading post at Fort Nisqually, Wash., 1834-1870.

Howard, W. E. (Field Sta. Admin., U. Calif., Davis.) AMOUNT OF FOOD EATEN BY SMALL CARNIVORES. J. Mamm. 38(4): 516-517. Nov. 1957.

Foods, feeding, and food consumption of 1 Bassariscus, 1 house cat, and 1 Mustela frenata in captivity.

## BEARS

Clark, Webster K. (US F&WS, Kodiak, Alaska.) SEASONAL FOOD HABITS OF THE KODIAK BEAR. Trans. 22nd N. Am. Wildl. Conf. p. 145-149. 1957.

Omnivorous and scavenging habits of Kodiak brown bear are shown in data from scat examinations, stomach analyses, and feeding observations. Grazing and berries account for approximately three-fourths of yearly diet; scavenging and fishing for remainder. Food habits can be roughly described as follows: winter-early spring--carrion, sea weed; spring-early summer--greens; mid-summer--greens and fish; late summer-mid-fall--berries; late fall-winter--cleanup (fish carcasses, carrion, berries).--Author.

Erickson, Albert W. (Cusino Wildl. Exp. Sta., Shingleton, Mich.) TECHNIQUES FOR LIVE-TRAPPING AND HANDLING BLACK BEARS. Trans. 22nd N. Am. Wildl. Conf. p. 520-543, 18 photos. 1957.

Techniques developed in Mich. during live-trapping, handling, and marking 96 bears. Bears were captured in culvert box-traps (the most successful were constructed of 8-foot sections of 36-inch culvert, a metal grid back, and a sliding drop door) and number 4.5 steel-spring wolf traps. The latter proved the most economical and practical. A large piece of unspoiled venison proved the best bait, while fetid meats and fish were poor. Box-trapped bears were anesthetized with ether after the trap was made airtight. They were continued under anesthesia with ether administered via a cone, or by an intraperitoneal injection of pentobarbital sodium. Bears captured in steel traps were handled by first placing a chain loop, at the end of a 6-foot section of pipe, over the animal's head and twisting it down snug. The bear's head could then be controlled by one man while another fastened ropes to the hind legs and fastened them to trees. Ether was then administered via the ether cone or the animal was given a shot of pentobarbital. Bears were marked with metal ear tags and by toe clipping. Evidence now indicates that metal ear tags are a reliable marking technique for black bears, and that toe clipping is impracticable.--Author.

RACCOON, RINGTAIL, COATI

Gewalt, Wolfgang. THE "WASHING" OF PROCYON LOTOR L. Z. Säugetierk. 21(3/4): 149-155, pl. 8. Feb. 1957. [From J. Mamm. 38(4).]
In German.

Rusovski, N. N. FEEDING HABITS OF PROCYON LOTOR. Zool. Zh. 36(2): 280-288. 1957. [From J. Mamm. 38(4).]
In Russian with English summary.

MUSTELIDS

Bradle, Bernard J. (Wis. Cons. Dept., Crandon.) THE FISHER RETURNS TO WISCONSIN. Wis. Cons. Bul. 22(11): 9-11, 2 photos. Nov. 1957.
Fourteen fishers from Adirondacks have been released in Nicolet National Forest of Wis. Others will follow. Fishers were obtained in exchange for quail. A 40,000-acre management area in the forest has been set up to protect the fishers from such hazards as trapping for upland animals. A little general information is given on natural history of fishers.

DOGS, WOLVES, FOXES

Cutter, Wm. L. (Mus. Nat. Hist., U. Kans., Lawrence.) DENNING OF THE SWIFT FOX IN NORTHERN TEXAS. J. Mamm. 39(1): 70-74, 1 fig. Feb. 1958.
Data on habitat relationships of 25 occupied dens, notes on characteristics of 1 den, and notes on behavior of foxes at dens. [It is good to know that this fox is still present in such numbers that 1 person can see 25 active dens in a 3-year period. One ordinarily thinks of it as nearly extinct.]

Hogue, Jack. (Colo. Dept. Game.) THE RED FOX. Colo. Outdoors 7(1): 12-14, 1 photo. Jan.-Feb. 1958.
A general review of habits, but includes original data on food habits in Colo., where foxes have increased since early 1940s. Reports of fox predation on domestic sheep could not be substantiated. Evidence was found of heavy predation on sage grouse, waterfowl, quail, and pheasants. Many of the game birds taken were nesting ??. It was also found that foxes were taking martens from trap lines and killing many martens. Hogue implies that rodent control has forced foxes to turn to other foods, but he mentions 1 family of foxes for which the chief food seemed to be hen pheasant although rabbits and rodents were abundant around the den.

Korschgen, Leroy J. (Mo. Cons. Comm., Columbia.) FOOD HABITS OF THE COYOTE IN MISSOURI. J. Wildl. Mgt. 21(4): 424-435, 1 graph. Oct. 1957.
770 stomachs collected throughout Mo. at all seasons contained 56 animal, 28 plant, and 6 misc. items. Principal foods, by volume, were: rabbits, 53.7; poultry, 11.3; livestock, 8.9; mice and rats, 8.7; other mammals, 7.5; carrion, 5.8; invertebrates, 0.8; birds, 0.5; undet. animal matter, 0.4; plant foods, 2.0; and misc., 0.2%. Close relationship existed between the rabbit population, as determined by roadside census, and percentage of rabbit in coyote diet. Correlation coefficients demonstrated this relationship. Extent and effect of predation upon managed wildlife species, and seasonal extent of coyote predation upon livestock and poultry, are discussed.--Author.

Parker, R. L., J. W. Kelly, E. L. Cheatum, and D. J. Dean. (Kelly & Cheatum: N. Y. Cons. Dept.) FOX POPULATION DENSITIES IN RELATION TO RABIES. N. Y. Fish & Game J. 4(2): 219-228, 1 fig. July 1957 [Jan. 1958].
From abstract: "In order to appreciate more fully the effect of a long-continuing rabies enzootic in foxes on the population of these animals, a technique was devised for comparing population densities in various areas. Several towns in the rabies-enzootic region of the State and several towns in the rabies-free region were trapped nearly simultaneously by experienced trappers. Traps were set not less than one-half mile apart and the number of traps used was determined by the land area of the town. Records of the catch were kept and the data presented as trap nights per fox. Each town was trapped for 10 consecutive nights in 1955 and 1956. Comparing the data for the rabies-free and the rabies-enzootic regions shows a significantly higher fox population [about twice as

high] in the non-infected region. Some differences existed between individual towns in each region which probably reflected variations in the ecology of these towns. From these findings it is assumed that certain barriers exist which prevent the spread of rabies into high fox populations in areas adjacent to the enzootic region." These barriers are believed to be Mohawk and Hudson rivers, and a strip that is heavily trapped for rabies control.

Tembrock, Günter. DAS VERHALTEN DES ROTFUCHSES. Handbuch der Zoologie (Berlin), Bd. 8, Teil 10, no. 15 (Lief. 9): 1-20, illus. Apr. 1957. [From J. Mamm. 39(1).]

Long paper on behavior of red fox.

Wood, John E. (Johns Hopkins Sch. Hygiene, Balt. 5, Md.) AGE STRUCTURE AND PRODUCTIVITY OF A GRAY FOX POPULATION. J. Mamm. 39(1): 74-86, 1 fig. Feb. 1958.

Gray foxes of the Thomasville, Ga., area were studied 1952-56. Age was determined by wear on conules of 1st upper molar. Other aging techniques studied involved skull sutures, development of vomer, weight of baculum, and body weight; these were less useful than tooth wear. Young weighed 3 oz. at birth and increased to 2 lbs. 8.6 oz. by 78th day. They attained adult weight at age of 5-6 months. Age structure, as determined from 5 populations, was much as in Thomasville population, where 61.1% of foxes were less than 1 year old, 28.3% 1 year old, 7.1% 2 years old, 1.8% 3 years old, and 1.6% 4 or more years old. Sex ratio was not significantly different from 1:1. Sexual maturity was reached in 1st year. Only 6.3% of all females failed to breed. Breeding began in late Dec. and reached peak in Jan.-Feb. Numbers of embryos did not differ significantly from numbers of placental scars. They av. 4.5 per litter. No difference was found in fecundity of different age groups. The probability of a fox dying from its 1st Nov. to its 2d Nov. is about 0.7. For succeeding years it is about 0.5. The probability of dying (on an annual basis) during the first summer is about 0.5, and during the 1st winter about 0.9.

Wood, John E., David E. Davis, and E. V. Komarek. (Johns Hopkins Sch. Hygiene, Balt. 5, Md.) THE DISTRIBUTION OF FOX POPULATIONS IN RELATION TO VEGETATION IN SOUTHERN GEORGIA. Ecology 39(1): 160-162. Jan. 1958.

Summary: "The abundance of Gray Foxes...differs greatly within local areas in the region of southern Georgia. The analysis of the contents of 171 fox stomachs in various years and places gives a suggestion of the importance of certain basic foods. The foxes are most abundant in the areas of mixed woods and cultivation, next in areas of savannah pine and least in mixed woods with dense underbrush, and it is apparent that the abundance of foods eaten by foxes decline in this order in the three vegetation types." Foods are tabulated, by volume and frequency, for winter, summer, and whole year. Chief foods, by volume, are rabbits, insects, rodents, persimmons, peanuts, and birds.

## CATS

Cawthon, Jack. THE DAY THE PANTHER PROWLED. W. Va. Cons. 21(9): 12-13, 2 photos. Nov. 1957.

Deliberate hoax accounted for the widely published reports of a panther being trapped near Richwood, W. Va. in Sept. 1957. Hoax is explained here.

Davis, W. B. (Texas A & M Coll., College Sta.) OCELOT...DENIZEN OF THE BRUSH COUNTRY. Texas Game & Fish 16(1): 16-17, 2 figs. Jan. 1958.

Brief review of natural history, with emphasis on status and distribution in Texas. Now nearly limited to brush country s. of San Antonio, the ocelot is becoming scarcer and is expected to be extirpated from Texas as a result of brush removal and predator control.

Dücker, Gerti. FARB- UND HELLIGKEITSSEHEN UND INSTINKTE BEI VIVERRIDEN UND FELIDEN. Zool. Beiträge (Berlin), n.s. 3(1): 25-99. 1957. [From J. Mamm. 39 (1).]

Valverde, José A. (Inst. Aclimatacion, Almeria, Spain.) NOTES ECOLOGIQUES SUR LE LYNX D'ESPAGNE, FELIS LYNX PARDINA TEMMINCK. La Terre et la Vie (Paris) 104(1): 51-67, 4 figs. Jan.-Mar. 1957.

In French. The lynx in Spain is very nearly restricted to estates in the South. Its habitat is brushland, in contrast to that of Felis lynx lynx, which is forest. Principal food is Oryctolagus cuniculus. Young deer are also important food. Lesser prey species are listed. The lynx stalks the rabbit and leaps on it. It carries its food away to eat. Certain parts are preferred, and the rest is covered and left, but not revisited. The lynx will kill foxes, dogs, and mongooses, but does not eat them. Other competitors are listed. Man is the principal enemy. Notes are given on reproduction, growth, weights, sex differences, and daily habits. Home range is estimated to be 4-10 km. In winter lynxes may travel farther. One individual was tracked 20-30 km. in one night. There is real danger for the future of the lynx population from the planting of Eucalyptus in its preferred habitat, and also from the spread of myxomatosis, which is resulting in a very serious depletion of its basic food.--L. F. Stickel.

## BIG GAME, GENERAL

Anon. AVAILABILITY OF SURPLUS BIG-GAME ANIMALS ON NATIONAL WILDLIFE REFUGES. US F&WS, Wildl. Leafl. 390. 6 p. Aug. 1957.

Where and how to buy living bison, elk, longhorns, or meat from them.

Anon. DART GUN TRANQUILIZERS. J. Am. Vet. Med. Assn. 132(6): 237. Mar. 15, 1958.

"A new dart-type gun, a carbon dioxide rifle which shoots a syringe-loaded dart up to 40 yards, was recently demonstrated by Dr. F. B. Hayes [F. A. Hayes?] of the University of Georgia. In addition to the nicotine compounds previously reported, a new phenothiazine type of tranquilizer, DiQuel, was used. The drug was designed by Jen-Sal Laboratories exclusively for use in the veterinary field and has been approved by the Food and Drug Administration for use on livestock. The normal dose in cattle is effective for two or three days.--Nat. Provisioner (Dec. 28, 1957): 13." [Complete.]

Cook, Bessie B., Lois E. Witham, Marion Olmstead, and Agnes Fay Morgan. (Calif. Agr. Exp. Sta., Berkeley.) THE INFLUENCE OF SEASONAL AND OTHER FACTORS ON THE ACCEPTABILITY AND FOOD VALUE OF THE MEAT OF TWO SUBSPECIES OF CALIFORNIA DEER AND OF ANTELOPE. Hilgardia (Calif. Agr. Exp. Sta., Berkeley) 19(8): 265-284, 8 graphs. June 1949.

Corner, A. H., and Robert Connell. (Elk Is. Natl. Park, Lamont, Alberta.) BRUCELLOSIS IN BISON, ELK AND MOOSE IN ELK ISLAND NATIONAL PARK, ALBERTA, CANADA. Can. J. Comp. Med. & Vet. Sci. 22(1): 9-20. Jan. 1958.

From summary: "Serological specimens from 343 bison, 221 elk and 124 moose... were examined for brucellosis. The moose were all negative, 42.27% of the bison were reactors, and 13.12% of the elk were reactors. The occurrence of reactor bison in Wood Buffalo National Park and Riding Mountain National Park in Manitoba are mentioned and of reactor elk in Waterton Lakes National Park in...Alberta. Two cases of brucellosis in moose are described. The disease observed in moose was a severe progressive generalized infection quite unlike the disease in bison, elk and domestic animals. The authors feel that infected elk may play a role in the transmission of brucellosis, including transmission to domestic cattle outside of parks. Studies of brucellosis in wildlife should be extended to other species and areas."

Cringan, Alexander Thom. (Ont. Agr. Coll., Guelph.) HISTORY, FOOD HABITS AND RANGE REQUIREMENTS OF THE WOODLAND CARIBOU OF CONTINENTAL NORTH AMERICA. Trans. 22nd N. Am. Wildl. Conf. p. 485-500, 3 graphs. 1957.

Food habits study and range survey of 495 plots on Slate Islands, Lake Superior, showed woody browse lightly used and arboreal and terrestrial lichens heavily used by woodland caribou in winter. Abundance of reindeer moss varies with moisture and light. Abundance of tree lichens varies with forest composition, density, age, and moisture. Best conditions for woodland caribou exist

in mature coniferous to mixed-wood forest. Supply of tree lichens is more apt to be regular than that of ground lichens. Forest management, fire protection, and harvest are important in planning woodland caribou management.--Author.

Denney, Richard N. (Colo. Game Dept.) AN INDICATED TECHNIQUE TO DETERMINE THE SEX OF DRESSED ELK CARCASSES. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 211-217 + 3 pl. 1957.

Describes, defines, and illustrates characters of pubic region that field men can use in law enforcement. "This preliminary investigation suggests that elk carcasses possessing a conjugate diameter measurement of six inches or less are probably bulls, and those exhibiting a conjugate diameter of more than six inches are undoubtedly cows. Carcasses possessing a common measurement of the conjugate diameter of six inches can generally be sexed by other aids, such as the presence of the pizzle eye, the shape of the aitch bone, and the overall comparative size--taking a large bull or a heifer or small cow to share a common measurement of around six inches. This technique, if it holds up under more intensive investigation, promises to be a valuable tool in game management and law enforcement in restricted elk hunting areas."

de Vos, Antoon. (Ont. Agr. Coll., Guelph.) SUMMER OBSERVATIONS ON MOOSE IN ONTARIO. J. Mamm. 39(1): 128-139, 2 figs., 2 pl. Feb. 1958.

Summary: "Summer observations on moose behavior in an aquatic environment in Ontario during 1952, 1953 and 1955 are discussed. Moose are somewhat vocal during the summer. Three different calls can be recognized: an alarm call and two different communication calls between a cow and her offspring. Moose congregate in certain places because of a high availability of aquatic food. Feeding on aquatics starts in early June and terminates in late October. The peak of utilization is in late June, July, and early August. Lists of aquatic vegetation are presented. Definite effects of temperature and humidity on the movements of moose could not be demonstrated. There was no apparent difference in moose activity on warm and cool days, nor at times of wind or rain. Field data indicate that moose will be seen less frequently at midday. The evening peak of activity seems to be slightly higher than the morning peak. During the middle of the day the ratio of bulls to cows was higher than in the early morning or during the evening."

Fuller, William Albert. (Box 2357, Whitehorse, Yukon.) THE BIOLOGY AND MANAGEMENT OF THE BISON OF WOOD BUFFALO NATIONAL PARK. Ph.D. thesis, U. Wis. 137 p. 1957. [From long abstract in Dissertation Abstracts 17(11).]

History, ecology, behavior, diseases, parasites, reproduction, and survival of this herd were studied in detail, and a management program was proposed. The herd has been essentially the same size for 20 years. 36% of ♀ bison reached sexual maturity in their 2nd year, 52% in 3rd year. Young are conceived on the av. of 2 years out of 3 until onset of old age. Overall conception rate was 57%, lower than reported for other bison herds. ♂♂ reached maturity by the end of their 3rd year. Post-calving calf crop reached 25% of total herd, but dropped to less than 10% in one year. Mortality from tuberculosis was 5% in one year; 39% of 1508 animals examined showed lesions. Incidence increased from 15% of yearlings to 56% of aged animals. Appendices deal with age determination from horns and teeth, and with behavior and social organization.

Halloran, Arthur F., and Oscar V. Deming. (US F&WS, Cache, Okla.) WATER DEVELOPMENT FOR DESERT BIGHORN SHEEP. J. Wildl. Mgt. 22(1): 1-9, 4 photos. Jan. 1958.

Authors' summary: "On refuges for bighorn sheep in the Southwest, watering devices have materially improved range conditions for this species. Dependable water is needed every 5 miles in favorable habitat. Springs are kept free of debris and are protected from cloudbursts, livestock, and evaporation by covered troughs in safe locations. Rain catchments have been extremely useful, especially those providing water that will last 12 to 18 months. Reinforced concrete dams are used in water-cut canyons; underground storage tanks have been blasted into the sides of arroyos. Earthen dams are useful under special conditions. These developments are readily accepted by the sheep, but care must be taken (1) to avoid piping water to troughs that are too far away from traditionally used sites, (2) to locate installations with due respect to local 'rain shadows' and poaching possibilities, (3) to use sealers on rock and concrete, and (4), under certain conditions, to provide ramps for the animals' use."

Haltenorth, Theodor, and Werner Trense. BIG GAME OF THE WORLD AND ITS TROPHIES. Bayerischer Landwirtschaftsverlag GMBH, Bonn-München-Wien. xii + 436 p., 264 figs., 12 col. pl., 6 maps. 1956. DM 56 ($13.00). [From long review by W. Prychodko, J. Mamm. 38(4).]

In German with English and French legends. Important work on not only trophy scoring, but also on conservation status of spp. and ssp. Both international and Boone & Crockett Club systems of scoring trophies are used in the book. Sections of the book are: Foreword, Big game and man, History of development of evaluation of trophies, Trophies in biological aspect, Big game of the World and evaluation of its trophies, Systematic position of big game, Preparation and care of trophies, Bibliography (includes mostly post-war literature), Major trophies of the world, and Index. "The voluminous chapter 'The big game of the world and the evaluation of its trophies' (it covers two-thirds of the whole work) is of particular interest to students of mammalogy and to conservationists. In this chapter the authors list over 265 species of mammals with over 1,200 subspecies, providing brief information on distribution as well as on habits and habitats for each of them. Statements concerning the numbers of each subspecies show that the existence of about 280 forms is in danger. Recently extinct species and subspecies are also commented on... The chapter includes information on the present distribution and abundance of game animals introduced into different parts of the world. In addition to the mammals, attention is given to seven species of alligators, thirteen species of crocodiles and one gavial." The book has excellent drawings, fine color plates, and is well produced. "... the work...besides presenting for the first time an international scoring system ...has contributed a great deal to our knowledge of the present status of big game in different parts of the world. It is likely to become a standard source of information in the field, especially if it is translated into other languages ..."

Hancock, Norman V. (Utah Dept. Game.) A PRELIMINARY REPORT OF ELK REPRODUCTION IN UTAH WITH SPECIAL REFERENCE TO PRECOCIOUSNESS IN THE YEARLING FEMALE. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 195-197. 1957.

Yearling elk were found to ovulate and bear young, especially after mild or moderate winters. Incidence of ovulation by yearlings varied by herd and year from 0 to about 67%.

Huxley, J. S. THE HETEROGONY OF DEER ANTLERS. In Problems of Relative Growth, p. 42-49. Dial Press, N. Y. xix + 276 p. 1932.

Relationship of antler weight to body weight and age of roe and/or red deer. Data are given and growth curves are presented graphically. References are listed that I believe are unknown to most deer biologists. "It appears quite definitely that although there may be much individual variation even in one locality, and though extraneous agencies such as the amount of lime in the soil affect relative antler-weight considerably, yet when the mean of considerable numbers is taken, the results approximate to the formula for constant differential growth-ratio. This applies to adult animals. When antler-growth is taken by age for single individuals, it will be seen that the differential growth-ratio of the antler-weight is not constant, but declines steadily with age... What our results tell us is that at any given body-size the total amount of material which can be incorporated in the organ is proportional to the body-size raised to a power (the exact value of the power also varying with age)."--V. Schultz.

Jackson, A. S. (Texas Game Comm.) HUNTER'S CHALLENGE. Texas Game & Fish 16(1): 12-14, 24-25, 5 photos. Jan. 1958.

Account of release of 31 Barbary sheep in Palo Duro Canyon, Texas, Feb. 1, 1957. Includes some information on habits and foods as observed after the release, and gives quite a bit of information on conditions in the canyon and adjacent escarpment country into which the aoudads are expected to spread. The area is not now good game country; competition with native game is not likely to be serious. Barbary sheep should, in time, provide rugged big-game hunting, as they do in N. M.

Julander, Odell. (Intermtn. For. & Range Exp. Sta., Odgen, Utah.) TECHNIQUES IN STUDYING COMPETITION BETWEEN BIG GAME AND LIVESTOCK. J. Range Mgt. 11(1): 18-21, 2 maps. Jan. 1958.

Deer compete with cattle and sheep for the same foods in many areas. Competition varies with each unit of range. Proper management depends on knowledge of competition for important forage species on representative areas. The present paper describes the various kinds of detailed studies that are made to obtain this information and gives examples of results. Workers in other fields may be surprised at the scope, intensity, and diversity of these studies.

Longhurst, Wm. M. (U. Calif. Field Station, Hopland.) THE EFFECTIVENESS OF HUNTING IN CONTROLLING BIG-GAME POPULATIONS IN NORTH AMERICA. Trans. 22nd N. Am. Wildl. Conf. p. 544-569, 8 maps. 1957.

Results of a questionnaire survey mailed to game administrators and technicians in the U. S., Canada, and Alaska. All commonly hunted species were included in the survey: white-tail deer, mule deer, elk, antelope, moose, mt. sheep, mt. goat, javelina, and caribou. The following information is presented in tabular form by area: estimated range size, number, trend in numbers, types of hunting seasons, numbers of hunters, hunter success, percent kill, and whether legal hunting is successfully controlling numbers. There also are tabulations of factors which prevent control by hunting, other factors which are responsible for control, and areas where control by hunting is not yet desired because of understocked ranges. White-tails are still increasing over most of their range, with only 14 states reporting controlled herds on 28% of their total range area. Eight states claim control of mule deer on 44% of their total range. Ten states control elk on 91% of their range. Moose are controlled in 2 states covering 42% of their range. Control of antelope is reported on 66% of their range. None of the other species is considered under control. Important factors preventing control by hunting are: public opposition to management, shooting males only, poor distribution of hunters, inaccessibility, not enough hunters, closed areas, and legislative restrictions.--Author.

Owens, Dwight, and Paul Gilbert. (Colo. Dept. Game.) DEER, ELK AND WHIRLYBIRDS. Colo. Outdoors 7(1): 26-28, 3 photos. Jan.-Feb. 1958.

Evidence that helicopters are better than planes for big-game studies. Counts made from helicopters were higher; sex and age ratios could be determined much more effectively. The helicopter worked well at altitudes of 11,000 ft. "The helicopter will play a big part in future conservation."

Pillmore, Richard E. (Colo. Game Dept.) LUNGWORM AND ITS RELATIONSHIP TO BIGHORN SHEEP MANAGEMENT. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 198-205. 1957.

Infestations with Protostrongylus stilesi can cause heavy mortality of bighorns regardless of condition of range or bighorns. Losses seem to be heaviest where bighorn populations are highest. Only 1 bighorn herd in Colo. is free of P. stilesi. Incidence in 1 herd is 100%. Five species of Protostrongylus occur in Colo.; their mammalian and snail hosts are listed. Life history of the nematode is reviewed briefly. Factors affecting transmission of the worms and incidence of infection are discussed. Chances of infection vary with concentration of both bighorns and snail hosts. Management to minimize infection is not simple. It may involve reducing large bighorn populations, forcing dispersal by hunting, fencing, reducing snail populations locally, preserving or creating really good bighorn range, and avoiding placement of salt or other attractants where there are snails. 30 references.

Pimlott, D. H., and W. J. Carberry. (Wildl. Div., St. John's, Newfld.) NORTH AMERICAN MOOSE TRANSPLANTATIONS AND HANDLING TECHNIQUES. J. Wildl. Mgt. 22(1): 51-62, 5 figs. Jan. 1958.

Moose were trapped in Newfoundland and released in s. Labrador. Twelve were successfully transferred. In addition, 10 died, 7 were set free, and 3 escaped. Much information is given on trapping and handling techniques. Pole-type corral traps were used. Moose were transported in individual crates to a holding corral and later crated again for transportation to Labrador by truck and ship. Experiences of other workers in trapping and shipping moose are reviewed in detail. Mortality of moose during trapping and transporting has been high: on the av., for every 2 animals transported, 1 has died. Some factors that have affected mortality are discussed.

Quimby, Don C., and J. E. Gaab. (Mont. State Coll., Bozeman.) MANDIBULAR DENTITION AS AN AGE INDICATOR IN ROCKY MOUNTAIN ELK. J. Wildl. Mgt. 21(4): 435-451, 3 figs. Oct. 1957.

Mandibular dentition of 168 known-age and 527 assigned-age elk were basis of study. Calves, yearlings, and 2-year-olds were readily segregated by types (deciduous or permanent), number, and stage of eruption of teeth. Elk more than 2 years old had complete permanent mandibular dentition, which separated these animals from 2-year-olds that retained any of the milk dentition. For 2-year-olds that had lost all milk dentition, condition of certain teeth was characteristic. Wear on mandibular cheek teeth appeared to provide the best criterion for aging elk with a "full mouth." Only characters thought to be indicative of wear and amenable to quantitative expression were considered. Five characters were prominently represented in the 3-year-olds. None of the characters, either singly or in various combinations, eliminated all 4-year-olds. The best combination separated 87.5% of the 3-year-olds and 12.5% of the 4-year-olds into a group: 3 or 4 years old. Five characters were prominently represented in the 4-year-old specimens. The best combination separated 100, 73, 36, 17.5, and 5% of the 3-, 4-, 5-, 6-, and 7-year-olds, respectively, into a group: 3, 4, 5, 6 or 7 years old. Aging of elk jaws by comparison with specimens on a jaw board also indicated variation within year classes, but not so great as indicated by use of the specific characters. It was concluded that age-class data should be secured by (1) direct comparison with known-age jaws, (2) comparison with assigned-age jaws, or (3) comparison with drawings or photographs of known-age jaws.--Don C. Quimby.

Rich, G. B. (Ent. Lab., Kamloops, B. C.) THE EAR TICK, OTOBIUS MEGNINI (DUGES) (ACARINA: ARGASIDAE), AND ITS RECORD IN BRITISH COLUMBIA. Can. J. Comp. Med. & Vet. Sci. 21(12): 415-418. Dec. 1957.

This tick is widespread in U. S. in wild and domestic ungulates. It may cause death of host. Symptoms and life history are outlined.

Ritcey, R. W., and R. Y. Edwards. (Dept. Recreation and Cons., Victoria, B. C.) PARASITES AND DISEASES OF THE WELLS GRAY MOOSE HERD. J. Mamm. 39(1): 139-145. Feb. 1958.

Summary: "A moose herd in British Columbia, which appears to be inhabiting exceptionally good range, harbors the following organisms in some abundance: moose tick, bladderworm [Cysticerus tenuicollis], hydatid cyst and legworm. Also present are nose fly, measles [Cysticercus sp.], contagious warts and actinomycosis. Bladderworm, hydatid cyst and legworm were found in 84, 68 and 95 per cent, respectively, of the moose examined."

Seitz, Alfred. TRAGZEIT, FRUCHTBARKEIT, TODESURSACHEN BEIM MÄHNENSCHAF (AMMOTRAGUS LERVIA PALLAS). Zool. Garten (Leipzig) 23(1-3): 54-57. 1957. [From J. Mamm. 39(1).]

Gestation period, productivity, and causes of death of Barbary sheep.

Shaw, Wesley. (Idaho Game Dept.) BIGHORN SHEEP HUNTING IN IDAHO. Idaho Wildl. Rev. 10(4): 8-11, 3 photos. Jan.-Feb. 1958.

Gives a good bit of background information on the bighorn situation in Idaho and presents statistical data on the recent permit hunts.

Sugden, Lawson G. (B. C. Game Dept., Box 512, Williams Lake.) A STUDY OF CALIFORNIA BIGHORN SHEEP (OVIS CANADENSIS CALIFORNIANA DOUGLAS) WITH PARTICULAR REFERENCE TO THE CHURN CREEK BAND. M. S. thesis, Utah State Agr. Coll. 131 p. 1957.

In a survey of bighorns in B. C., it was found that 3 bands w. of Frazer R. are in poor status. Loss of range through competition, hunting, cougar predation, disease, and parasites are all believed to have contributed to the decrease. Trophy hunters killed large numbers of sheep w. of the Frazer between 1890 and 1910. Management suggestions include a trapping and transplanting program, salting for better distribution, cougar control, protection from excessive human influences, and reduction of overuse by livestock.--Jessop B. Low.

Sweatman, Gordon K. (Health of Animals Div., Can. Dept. Agr., Macdonald Coll., P. Q.) LIFE HISTORY, NON-SPECIFICITY, AND REVISION OF THE GENUS CHORIOPTES, A PARASITIC MITE OF HERBIVORES. Can. J. Zool. 35(6): 641-689, 55 figs. Dec. 1957.

Comprehensive monograph. Chorioptic mange mites of several nominal species were reared and crossed. Each stage of life cycle is described. Transmission and related matters are discussed. All named forms of Chorioptes except one are synonymized under C. bovis.

Thomas, Earl M. (Wyo. Game Comm.) THE VALUE OF AERIAL SURVEYS IN BIGHORN SHEEP MANAGEMENT. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 225-229. 1957.

How Wyo. is using airplane to get data on distribution of herds, numbers of animals, movements, and sex and age ratios. Use of these data in management is discussed. It was found that travels from summer to winter range are not over 15 mi. and are usually no more than 2 mi. Age and sex ratio data are tabulated for 1956-57.

Townsend, Joseph E. (Mont. Game Dept.) GAME MANAGEMENT ASPECTS OF THE GALLATIN ELK HERD IN MONTANA. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 206-210. 1957.

The herd summers in high country in and near Yellowstone Park and moves n. to lowlands for winter. Winter range is limited in extent, seriously overbrowsed, and badly eroded. Winter feeding is only partially successful and is very expensive; it does not prevent starvation and it leads to drastic abuse of areas near feeding grounds. Solution of the problem was obvious: reduce herd and provide more winter range. It took years, however, to get enough public support. The state did manage to acquire 2 parcels of winter range. Finally, in 1956, herd was cut by about half. Winter mortality was then negligible. Herd will be kept at lowered level until range conditions can support larger herd.

Trotter, R. H. (Ont. Dept. Lands & For., Toronto.) AN AERIAL CENSUS TECHNIQUE FOR MOOSE. Presented at 1958 conf. NE. Sec. Wildl. Soc. et al. 10 p., mimeo. Jan. 1958.

Ont. needed better data on moose population. Search by helicopter and transects flown by airplane did not give counts as high as those of a new Gogama method. In the Gogama method, plots of 16 to 25 sq. mi. are selected to represent vegetational areas. These plots are subdivided into naturally delimited subplots. Each subplot is exhaustively searched by plane carrying pilot, navigator, and 2 observers. Plane is flown no faster than 90 m.p.h. and no higher than 700 ft. Work is done when moose are on winter grounds and earth is well covered with fresh snow. The method is of little value over a closed canopy of conifers, but few moose use such cover owing to lack of food.

Ustinov, V. I., A. A. Pokrovsky, and P. D. Bogdanov. ORGANIZATION OF THE FOOD BASIS FOR REINDEER CULTURE ON CHUKOTKA. Zhivotnovodstvo 1954(11): 62-68. 1954. [From long abstract in Biol. Abs. 32(2); transl. from Referat. Zhur., Biol., 1956, no. 53886.]

In Russian. Observations were made in the Chukotsky, Anadyr and Markov regions to study the winter pasture feeding of reindeer. Calculation of the ratio of feeds in the animals' rations showed a high degree of consumption of grassy plants (8.7 to 93.7%). Investigations also showed replacement of lichens by higher vegetation and the gradual reduction of reindeer moss pasturage. In spite of the belief in the irreplaceability of reindeer moss, a conclusion is drawn regarding the possibility of the reindeer transferring to grassy fodder. Practical measures are recommended for introducing grasses into this culture. There is a discussion of the question of reindeer raising in relation to the decrease in the importance of reindeer moss feeds. Production is shown by regions.

DEER (Odocoileus)

Bailey, Wm., Jr., George Schildman, and Phillip Agee. NEBRASKA DEER. Nebr. Game, For. & Parks Comm. 37 p., illus. 1957.
Popular informational pamphlet. It takes up history of deer in Nebr., characteristics of mule and whitetail deer, where deer live in Nebr., life history story, types of foods, senses, history of regulations, weights of mule deer in state, essentials of range and herd management, and facts of value to hunters in getting game and caring for meat.

Baker, Norman F., Wm. M. Longhurst, and James R. Douglas. (U. Calif., Davis.) EXPERIMENTAL TRANSMISSION OF GASTROINTESTINAL NEMATODES BETWEEN DOMESTIC SHEEP AND COLUMBIAN BLACK-TAILED DEER. Trans. 22nd N. Am. Wildl. Conf. p. 160-166. 1957.
Experiments were conducted to determine whether a partial host specificity is present in the gastrointestinal nematodes common to domestic sheep and Columbian black-tailed deer. Seven lambs were utilized in three trials to determine transmissibility of sheep strains when inoculated into sheep. Two lambs were inoculated with larvae cultured from deer feces. Three fawns were inoculated with larvae from sheep feces. Parasite-egg counts in feces of inoculated animals were made during the experiment. All animals were necropsied between the 56th and 70th day after inoculation. Total worm counts in gastrointestinal tract and % representation of various species were then determined. From 12-40% of the inoculated homologous (sheep to sheep) larvae reached maturity whereas only 2-4 percent of the heterologous (sheep to deer, deer to sheep) larvae matured. It was concluded that partial host specificity is present, and is more marked in Ostertagia than in Trichostrongylus and Nematodirus.--N. F. Baker.

Benson, Fred C., Jr. (U. Conn., Storrs.) CONNECTICUT'S WHITE-TAILED DEER STUDY - A PROGRESS REPORT. Presented at 1958 conf. NE. Sec. Wildl. Soc. et al. 4 p., mimeo. Jan. 1958.
Deer in Conn. are treated as agricultural pests. Permits to shoot them are issued widely, even where there are no real crops. Benson explains how this works, tabulates types of properties for which permits are issued, and tells how many of the permits are actually used for shooting deer. Persons who received free permits had 70.6% hunting success. "...Connecticut is the place to own land or know someone that does."

Carlsen, J. C., and Robert E. Farnes. (US F&WS, Holt, Minn.) MOVEMENTS OF WHITE-TAILED DEER TAGGED IN MINNESOTA. J. Wildl. Mgt. 21(4): 397-401, 1 map. Oct. 1957.
Contrasts movements of deer in coniferous forest with those in prairie-deciduous forest of Minn.; based on hunting-season recovery of ear tags. Longest travel was 22 mi. and av. was 5.1 mi. in coniferous area. Longest travel was 55 mi. and av. was 9.7 mi. in prairie-deciduous forest area. In the latter, younger deer moved much farther than older deer. Data indicate that deer in prairie-deciduous forest habitat are wider ranging than deer in coniferous forest habitat.--Authors.

Carroll, Theron D. ANTLERLESS DEER HARVEST (THE FIRST THREE YEARS). Texas Game & Fish Comm., Bul. no. 37. iv +/26 p., illus. 1957.
An extension booklet that contains some good factual data. It is designed to demonstrate the need of shooting antlerless deer to relieve overpopulations and die-offs. Facts from other states are reviewed to provide background, but most of the information pertains to conditions in Mason, Llano, Kerr, and Gillespie counties, Texas, where some hunts for antlerless deer have been tried in recent years. Values of the deer herd are discussed, reproductive potential of deer is outlined, die-offs are described, population estimates are stated, and results of antlered and antlerless deer seasons are detailed. It is interesting to note that 1 rancher received $23,500 for hunting rights in 2 seasons, and that each of the 4 counties received nearly half a million dollars in business from deer hunters in 1947-48. An appendix tells how deer populations are estimated from cruise lines.

Crockford, Jack A., Frank A. Hayes, James H. Jenkins, and Seldon D. Feurt. (Ga. Game Comm., Atlanta.) FIELD APPLICATION OF NICOTINE SALICYLATE FOR CAPTURING DEER. Trans. 22nd N. Am. Wildl. Conf. p. 579-583. 1957.
The drug was shot int deer from a distance through use of darts. In winter of 1956-57, 141 deer were captured; mortality was 9.2%. Materials, drug action, field technique and limitations are discussed.--J. A. Crockford.

Curtis, Robert O., and F. M. Rushmore. (Adirondack Res. Center, Paul Smiths, N. Y.) SOME EFFECTS OF STAND DENSITY AND DEER BROWSING ON REPRODUCTION IN AN ADIRONDACK HARDWOOD STAND. J. For. 56(2): 116-121, 2 figs. Feb. 1958.

Study of forest reproduction under different systems of cutting led to use of deer exclosures. The most desirable species, hard maple and yellow birch, were in competition with beech, hobblebush (Viburnum alnifolium) and red spruce. Deer browsed heavily on maple and white ash and less heavily on birch, beech, and hobblebush. In all, deer exerted a strong and undesirable influence on the composition and development of forest reproduction under 2 types of cutting. Circumstances favored deer damage: the cut plots were small areas of reproduction in the midst of uncut timber; they were within 1/4 mile of deer yards; and they were near extensive areas where hunting was restricted.

Dasmann, Wm. P., and Henry A. Hjersman. (Calif. Dept. Game.) DEER SURVIVAL AND RANGE FORAGE TRENDS ON EASTERN CALIFORNIA WINTER RANGES. Calif. Fish & Game 44(1): 51-72, 1 map. Jan. 1958.

Data on range condition, forage production, forage utilization, deer pressure, and fawn survival were gathered for 7 winter deer ranges of e. Calif. The areas were similar in year-to-year trends in fawn survival, current growth of bitterbrush leaders, percentage overbrowsing of bitterbrush, and degree of pressure on winter concentration areas as measured by pellet counts. It seems likely that region-wide trends in these elements can be followed by sampling only scattered ranges. Fawn survival differed between ranges, but fluctuations coincided. Once deer exceed optimum levels, fawn survival is closely related to forage production, which is determined by weather. But there may be a 1-year lag if breeders suffer and starve in hard winter. Relation of precipitation to amount of herbaceous vegetation deserves more study. Neither utilization of key browse species nor overbrowsing are reliable indicators of population trends, for they are affected by other factors. Inches of leader growth browsed and pellet counts are good indices, but one must sample the entire area that deer occupy in both mild and severe winters. These indices are of value in reflecting year-to-year pressure on the areas. Also, long-term fluctuations of populations may be indicated by comparison of surveys made over a series of years.

Hanson, Wm. R. (Ill. Nat. Hist. Surv., Urbana.) FAILURE OF MULE DEER TO WEAN OFFSPRING. J. Mamm. 39(1): 155. Feb. 1958.

Two instances are described. Results could be serious to mother and next young.

Haugen, Arnold O., and Daniel W. Speake. (Iowa State Coll., Ames.) AGE DETERMINATION OF YOUNG FAWNS. Presented at 19th Midwest Wildl. Conf. 6 p., mimeo., 2 figs. Dec. 1957.

Ten fawns of Odocoileus v. osceola were studied at Auburn, Ala., to find how age of very young could be estimated. Found useful were gelatinous pads on hooves and dewclaws, condition of umbilicus, and presence or absence of flight behavior. Correlations of these with age are tabulated. More useful was amount of hoof growth. "To determine age of fawns, measure the distance from the hairline to the distal edge of the new hoof growth. Multiply this measurement in millimeters by 2.2 and add 0.66 millimeters (regression formula $\hat{Y} = 0.66 + 2.2X$). The resulting sum is the estimated age of the fawn in days." In all, the characteristics mentioned permit estimation of age through 3.5 weeks.

Hodgin, F. M. (P. O. Box 482, Williams, Ariz.) DEER AND HABITAT MANAGEMENT ON THE KAIBAB NATIONAL FOREST. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 221-222. 1957.

Ariz. has a $5.00 Kaibab deer permit. Money is turned over to For. Serv. for range improvement. This paper briefly summarizes what is being done. Pinyon and juniper trees are removed to free moisture for more useful browse. Cliffrose (Cowania) has responded admirably. Pinyon and juniper have been controlled on 5000 acres, and the area was to be doubled in 1957. Two methods are used. One is by pulling 300-ft. cable between tractors. This takes out larger trees; cost is $2.00 per acre or less. Other method is to uproot trees with toothed bulldozer blade. Very small trees are cut by axe. Cost is $4.00 to $5.00 per acre. Aspen and spruce-fir are managed to provide aspen sprouts. Water developments of various types, including catchments, are installed. Experiments are conducted with fertilizing, seeding, and exclosures.

Laramie, Henry A., Jr., and Sumner A. Dole, Jr. (N. H. Game Dept., Concord.) EXPERIMENTAL DEER YARD MANAGEMENT IN NEW HAMPSHIRE. Trans. 22nd N. Am. Wildl. Conf. p. 501-519, 7 figs. 1957.

The winter carrying capacity of n. N. H. for deer has gradually diminished since the 1940's owing to extensive cutting of the softwoods which serve as winter cover. From surveys of deer yards and cutting practices made from 1948 to 1956, game biologists developed a new technique of integrating deer winter habitat with timber management. The biologists worked through the foresters of various large timber owners and convinced these owners to leave uncut over 5,500 cords of merchantable timber on over 900 acres of privately owned deer yarding areas. All this has been done by these owners free of charge. An additional 1,000 acres of softwood cover is being managed as deer winter habitat through a lease arrangement on 2,351 acres of land owned by the N. H. Water Resources Board. Techniques employed include leaving uncut strips of softwood cover in otherwise clear cut areas, and cutting groups and strips out of dense fir stands. These measures provide food and cover necessary to maintain deer during winter. Both types of cuttings have withstood wind throw and have been heavily utilized by deer.--Authors.

McEwen, L. C., C. E. French, N. D. Magruder, R. W. Swift, and R. H. Ingram. (For. Bldg., Elkins, W. Va.) NUTRIENT REQUIREMENTS OF THE WHITE-TAILED DEER. Trans. 22nd N. Am. Wildl. Conf. p. 119-130, 4 figs. 1957.

Male white-tailed deer were captured as fawns and fed controlled diets from 6 months through 42 months of age. Twenty to 30 deer were manipulated on various rations compounded at different nutritional levels. Optimum mineral levels were found to be about 0.65% Ca and 0.55% P. Optimum protein content was about 17%. Minimum mineral levels for survival were 0.25-0.30% each of Ca and P, but lower levels were tolerated as single deficiencies. Minimum protein level for survival during growth was 4-5%. Requirements varied seasonally. Minimum levels were tolerated during winter with little stress if deer entered winter in good condition. Optimum levels refer to the period Apr.-Oct. when body growth, antler development and/or fattening occurred. Quantitative requirements also varied with the seasons. From Apr.-Oct., voluntary consumption av. 4.5-6.5 lbs. (air-dry) per day for any deer past fawn stage. From Nov. through early Mar., voluntary consumption did not exceed 3 to 4 lbs. per day.--L. C. McEwen.

Merrill, Leo B., James G. Teer, and O. C. Wallmo. (Texas Range Exp. Sta., Sonora.) REACTION OF DEER POPULATION TO GRAZING PRACTICES. Texas Agr. Prog. 3(5): 10-12. Sept.-Oct. 1957. [From J. Range Mgt. 11(1).]

Morse, Marius, and Don Ledin. (Minn. Dept. Cons., Madelia.) DEER, APPLES, AND EXPLODERS. Cons. Volunteer 21(121): 29-31. Jan.-Feb. 1958.

Account of deer damage to apple trees in part of Minn. and experience with carbide exploders. The exploders functioned reliably only some of the time and their value in scaring deer was variable. Their use is recommended for temporary conditions. In the long run, herd control by legal hunting is required.

Robinette, W. Leslie. (US F&WS, Salt Lake City, Utah.) UNUSUAL DENTITION IN MULE DEER. J. Mamm. 39(1): 156-157. Feb. 1958.

4 cases of fewer teeth than normal and 4 cases of more than normal.

Silver, Helenette, and N. F. Colovos. (N. H. Game Dept.) NUTRITIVE EVALUATION OF SOME FORAGE RATIONS OF DEER. N. H. Fish & Game Dept., Tech. Cir. no. 15. ii + 56 p., 10 figs. 1957.

Wild white-tailed fawns were reared for trial feeding of hemlock and witch-hobble (Viburnum alnifolium). Deer were weighed, their temperatures and ambient temperatures were recorded daily, and food consumption was measured. Much information is given on handling of deer, difficulties encountered in the work, and precautions against errors. Browse preferences and possible reasons for inadequate consumption are considered. Many recommendations are made for ways of making nutritional experiments with deer. Results of study are incorporated in numerous graphs and tables. All deer lost weight in very cold weather regardless of type and amount of feed. This is believed to be normal. Results of a trial with hemlock differed widely from those of a similar trial made earlier, probably because of poor physical condition of fawns in earlier trial. Witchhobble was lower in protein than any other species tested; it was, however,

highly palatable and about twice as rich in minerals as other species tested. Browse in general is a good energy food although universally low in protein. Hemlock and witchhobble, although inadequate by themselves, are important in winter nutrition of deer and should be encouraged by all practical means. "Recommendations for improvement of the project include analysis of urine to determine seasonal changes in endocrine activity; vitamin assays of browse species already tested; determination of critical temperature of deer; determination of seasonal changes in protein content of browse; continuous records of weight changes of deer on hand, snow depths and temperatures; and, basal metabolism tests, if practicable."

Swank, Wendell G. (Ariz. Game Dept.) THE MULE DEER IN ARIZONA CHAPARRAL / AND AN ANALYSIS OF OTHER IMPORTANT DEER HERDS. Ariz. Game & Fish Dept., Wildl. Bul. no. 3. vii + 109 p., 37 figs. + drawings. Feb. 1958.

Good comprehensive research report based mainly on detailed studies of five herds: Three Bar, Prescott, Mingus, Bill Williams, and Kaibab North. Research data are well integrated with information from the literature. Chapter II describes the chaparral habitat. Chapter III gives information on deer reproduction in the chaparral, antler development, home ranges, and daily movements. Chapter IV discusses the major browse species, their ecology, response to browsing, nutritive value, and palatability. Chapter V discusses food as primary factor in control of game populations, importance of various nutrient elements, fluctuations of these elements in different browse plants, effect of these fluctuations on deer populations, and amounts of food required. Chapter VI considers decimating factors: food, drought, losses by sex and age groups, diseases, parasites, predation, and hunting. Chapter VII takes up population dynamics of the chaparral herd: productivity, herd composition, numbers, effect of hunting. Chapter VIII is a short discussion of possible habitat improvement by burning, railing, or otherwise creating new growth at 2-mi. intervals. Much of this work cannot be undertaken until more is known of its effects on runoff and erosion. Little of it is justified while kill is still too low. Chapters IX, X, and XI are detailed analyses of population dynamics in the Kaibab North, Bill Williams, and Mingus herds. They give much information on such factors as numbers, reproduction, mortality, and balance.

Dominant chaparral shrubs are very poor deer foods. The few useful plants are often overused by deer and cattle. Carrying capacity is about 10 deer per sq. mi. Populations may be higher or lower depending on range condition. This depends on precipitation and herd size. It determines die-offs and rate of production. Cattle often compete with deer, but are beneficial on av. because they cause dominance of browse over grass. Heavy hunting causes sharp increase of production. Hunting pressure on chaparral deer is far too light for good of range and production. Aside from water developments, management today should concentrate on getting 20-25% kill by means of any-deer seasons, special seasons, and better access. This necessitates keeping good knowledge of each range and each herd each year.

## MAMMALS--MARINE

Baker, Ralph C. FUR SEALS OF THE PRIBILOF ISLANDS. US F&WS, Cons. in Action no. 12. 24 p., illus. 1957. 20¢ from Supt. Documents.

A well-illustrated popular account of the history, biology, management, and utilization of our fur seals.

Berdegué, Julio. LATEST CENSUS OF THE GRAY WHALE IN WATERS OF BAJA CALIFORNIA. Ciencia [Mexico] 16(4-6): 99-109, illus. 1956 [1957]. [From Biol. Abs. 32(2).]

In Spanish. 2500-3000 gray whales annually immigrate into Mexican waters in Baja California, Sonora, Sinaloa and Nayarit, where nursing and calving areas were discovered. Under protection of laws dictated by International Whaling Commission the gray whale has increased every year from almost complete extinction of less than 100 individuals. The last air census in February, 1956, gave a total of 874 cows and 134 calves in waters of Baja California. Serious lethal or deleterious characters did not become fixed during the years of small population size. Sp. may however have today a genotype and phenotype quite different from that in the early part of the last century.--Author.

Chapskii, K. K. AN ATTEMPT AT REVISION OF THE SYSTEMATICS AND DIAGNOSTICS OF SEALS OF THE SUBFAMILY PHOCINAE. Trudy Zool. Inst. Akad. Nauk SSSR, no. 17, 1955. Translation by T. F. Jeletzky publ. by Fisheries Res. Bd. Canada (505 Pine Ave. West, Montreal, P. Q.) as Transl. Ser. no. 114. 57 p., 1 fig., proc. 1957. Available from publisher. No price stated.

This is a detailed discussion of the cranial morphology and its variations, taxonomy, and relationships of phocine groups from subspecies through tribes. Many characters are utilized and some interesting conclusions and arrangements are reached. In addition to its own value, the paper serves as a guide to earlier Russian work in this field.

Chittleborough, R. G., and K. Godfrey. A REVIEW OF WHALE MARKING AND SOME TRIALS OF A MODIFIED WHALE MARK. Norsk Hvalfangst-Tidende 46(5): 238-248. May 1957. [From J. Mamm. 39(1).]

Davies, J. L. (U. Tasmania, Hobart.) PLEISTOCENE GEOGRAPHY AND THE DISTRIBUTION OF NORTHERN PINNIPEDS. Ecology 39(1): 97-113, 15 maps. Jan. 1958.

Present distribution and subspecific relationships of northern pinnipeds are considered species by species and interpreted in the light of present ecology and Pleistocene geography. Davies' theories should be stimulating.

Fay, Francis H. (U.S.P.H.S., Box 960, Anchorage, Alaska.) HISTORY AND PRESENT STATUS OF THE PACIFIC WALRUS POPULATION. Trans. 22nd N. Am. Wildl. Conf. p. 431-443, map. 1957.

The historical record of Pacific walrus distribution and utilization indicates a reduction in walrus population from approximately 200,000 in the 18th and 19th centuries to about 45,000 in recent years. The numbers appear to be gradually decreasing at present. Elimination of wasteful hunting procedures and a larger proportion of ♂♂ in the annual kill would allow the population to increase to a more optimum level. 62 references.--Author.

Gibbney, L. F. THE SEASONAL REPRODUCTIVE CYCLE OF THE FEMALE ELEPHANT SEAL --MIROUNGA LEONINA, LINN.--AT HEARD ISLAND. Australian Natl. Antarctic Res. Exped. Rep., Dept. Ext. Affairs (Melbourne), ser. B, 1 (Zool.): 1-28. Feb. 1957. [From J. Mamm. 39(1).]

Grayce, Robert L. KEY TO THE MARINE MAMMALS OF NEW ENGLAND. Bul. Mass. Aud. Soc. 41(8): 417-419, 1 fig. Nov. 1957.

Key based on external characters. Designed primarily for use with specimen at hand. No data on range or occurrence.

Hubbs, Carl L. (Scripps Inst. Oceanog., La Jolla, Calif.) BACK FROM OBLIVION. GUADALUPE FUR SEAL: STILL A LIVING SPECIES. Pacific Discovery 9(6): 14-21, illus. Nov.-Dec. 1956. [From J. Mamm. 39(1).]

Kanwisher, J., and H. Leivestad. THERMAL REGULATION IN WHALES. Norsk Hvalfangst-Tidende 46(1): 1-5. Jan. 1957. [From J. Mamm. 38(4).]

Laws, R. M., and R. J. F. Taylor. (Natl. Inst. Oceanog., Eng.) A MASS DYING OF CRABEATER SEALS, LOBODON CARCINOPHAGUS (GRAY). Proc. Zool. Soc. London 129 (3): 315-324, 4 figs., 1 pl. Nov. 1957.

Some 3000 of these seals, mostly young, wintered on ice of Crown Prince Gustav Channel in 1955. They were 10 times as numerous as normal in winter. Unknown disease struck and an av. of 85% (locally 97%) of the seals died. Disease probably was of virus nature increased by crowding and partial starvation. It did not spread to other seals or to dogs or men that ate the flesh. No live births were observed during pupping season, only abortions. Some abortions appeared 3 weeks before the disease was noted. The epizootic probably had no appreciable effect on total number of crabeater seals in Antarctica.

Rasmussen, Birger. EXPLOITATION AND PROTECTION OF EAST GREENLAND SEAL HERDS. Norsk Hvalfangst-Tidende 46(2): 45-59. Feb. 1957. [From J. Mamm. 38(4).]

MAMMALS--MARINE--Continued

Scheffer, Victor B. (US F&WS, Sand Pt. Naval Air Sta., Seattle 15, Wash.) SEALS, SEA LIONS AND WALRUSES / A REVIEW OF THE PINNIPEDIA. Stanford U. Press, Stanford, Calif. x + 179 p., 15 figs., 32 pl. 1958. $5.00.

Important reference--surely the most useful single reference on classification, distribution, and numbers of pinnipeds. The author, well known for his work on the biology of these and other mammals, did much special study for this book while on a grant from the Natl. Sci. Found. The book is well documented, a key to the literature. The 26-p. list of references is based on the world's literature, and is up to date--publications of 1957 are used in the text. The first chapter is a concise but highly informative review of pinniped biology. It treats such topics as adaptations, locomotion, senses, nutrition, physiology, reproduction, and mortality. The next 2 chapters discuss the phylogeny and mode of evolution of families, genera, species, and subspecies. Chapter 4 explains Scheffer's taxonomic procedures and outlook. Chapter 5, which is much of the book, treats each group from order through subspecies. It takes up the taxonomy of each category and gives much information on distribution and numbers of each form. Maps show ranges. Minimum and maximum estimates of numbers existing today are not only included in the text but brought together in a table. Chapter 6 is a key to genera of pinnipeds. The key is unusually long and detailed; it includes much information on anatomy and also utilizes data on habits. The 32 plates, most of which bear 2 photos each, show most of the species in life, and also depict rookeries, certain features of structure, etc. The index is purely taxonomic. This book is a critical review of a large and controversial subject. Selectivity and judgment were necessary at many points, and other experts may not agree with each choice. But as a starting point for the specialist and as a technical handbook for the nonspecialist, this work is worthy of high commendation.

Thompson, Seton H. (US F&WS.) ALASKA FISHERY AND FUR-SEAL INDUSTRIES, 1955. US F&WS, Stat. Digest no. 40. iv + 85 p., 8 figs. 1957. 40¢ from Supt. Documents.

Beluga (white whale) was found to be serious salmon predator. Hair seals totaling 3,799 were destroyed, presumably to protect salmon. 65,453 fur seals, mostly ♂♂, were pelted. Age and size classes of these seals are tabulated. Too many reserve ♂♂ were found to have been left in previous years. Idle bulls increased by 29% from year before while harem bulls declined by 8%. 50,000 fur seals were tagged and toe-clipped. Of the ♀♀ harvested, 61% were pregnant. Deaths of pups declined 21.5% from year before. Research demonstrated that fur seals were not significantly predatory on salmon. It also revealed that 3-year-old ♂♂ tended to return to island where born. Av. price of finished fur seal pelt was $98.21, up 18.7% from year before. Use and sale of seal by-products is discussed. Attempts were made to restore sea otters to Pribilof waters; results were in doubt, for sea otters do not readily tolerate handling and transportation.

Tomilin, A. G. CETACEAN BEHAVIOR AND COMMUNICATION BY SOUND. Trudy Inst. Okeanol. Akad. Nauk SSSR 18: 28-47. 1955. [From long abstract in Biol. Abs. 32(1), transl. from Referat. Zhur., Biol., 1956, no. 49999.]

In Russian.

MAMMALS--OTHER GROUPS

Buchanan, G. D. (Sam Houston State Teach. Coll., Huntsville, Texas.) VARIATION IN LITTER SIZE OF NINE-BANDED ARMADILLOS. J. Mamm. 38(4): 529. Nov. 1957.

Guilday, John E. (Carnegie Mus., Pittsburgh, Pa.) THE PREHISTORIC DISTRIBUTION OF THE OPOSSUM. J. Mamm. 39(1): 39-43, 1 map. Feb. 1958.

Occurrence of Didelphis marsupialis remains in prehistoric Indian sites suggests that the opossum did not occur or was rare in the Appalachian Plateau of n. W. Va., w. Pa., and s. N. Y.

MAMMALS--OTHER GROUPS--Continued

Hamilton, W. J., Jr. (Cornell U., Ithaca, N. Y.) THE OPOSSUM IN NEW YORK. N. Y. State Cons. 12(3): 12-13, 6 figs. Dec.-Jan. 1957-58.
Report on stomach contents of 461 individuals and general review of habits. Chief foods were insects, 43% by frequency; mammals, 42%; grasses etc., 39%; fruits, 33%; earthworms, 24%; frogs and toads, 23%; birds, 19%; snails and slugs, 16%; reptiles, 11%; carrion, 8%; grain and nuts, 4%. Opossum pelt is now practically valueless. Hamilton regards opossum flesh as unpalatable. On the whole, the opossum is economically neutral.

Roth, E. E., and B. B. Knieriem. (Dept. Vet. Sci., La. State U., Baton Rouge.) THE NATURAL OCCURRENCE OF LEPTOSPIRA POMONA IN AN OPOSSUM--A PRELIMINARY REPORT. J. Am. Vet. Med. Assn. 132(3): 97-98. Feb. 1, 1958.

BIRDS--GENERAL

Anon. IMPROVEMENTS IN THE CANNON NET TRAP. US F&WS, Branch of Wildl. Refuges, Wildl. Mgt. Ser., Leafl. no. 12. 27 p., 9 figs., 6 pl., proc. Dec. 1955.
Information from many people was pooled to produce this comprehensive account of various types of equipment, methods of use, costs, modifications, correction of difficulties, and types of work in which useful. This may be the major paper to date on cannon nets. It does not, however, cover British rocket net techniques, which appear to have certain advantages.

Leitch, Wm. G., and Robert A. McCabe. (Ducks Unlimited, Winnipeg 2, Can.) AVIAN RECOVERIES FROM MUTILATING ACCIDENTS TO BOTH LEGS. J. Wildl. Mgt. 21(4): 458-459, 2 figs. Oct. 1957.
Photographs of a ? gadwall and a hen pheasant illustrating recovery from partial loss of both legs.--Authors.

Mollison, B. C. (Wildl. Surv. Sec., C.S.I.R.O., Regional Lab., Hobart, Australia.) A LIVE-TRAP FOR BIRDS. C.S.I.R.O. Wildl. Res. 2(2): 172-174, 1 fig. Oct. 1957.
Bill of materials, diagram, and instructions for use of cheap trap. Net is sprung when bird tugs on bait; or operator can release net at a distance. Was designed for hawks but can be adapted to take wide variety of birds that land on ground. Said to be similar to trap described by Tordoff in J. Wildl. Mgt. 18: 281-284.

Odum, Eugene P., and Gordon L. Hight. (U. Ga., Athens.) THE USE OF MIST NETS IN POPULATION STUDIES OF WINTER FRINGILLIDS ON THE AEC SAVANNAH RIVER AREA. Bird-Banding 28(4): 203-213, 3 figs. Oct. 1957.

Williamson, Kenneth. (17 India St., Edinburgh, Scot.) MIST-NETS VERSUS HELIGOLAND TRAPS. Bird-Banding 28(4): 213-222, 3 figs. Oct. 1957.
At Fair Isle, and probably at similar bird stations on islands, mist-nets are often unsatisfactory. The area may be too wet, windy, and bare. Under such conditions, well-built Heligoland traps are indispensable, for they work in any weather. And these traps are superior for certain types of studies. "At island stations mist-nets can be used as an ancillary to the established trapping routine when time and the weather allow. Being portable, they are of great value in emergency, as when a coveted rarity or critical species appears in a haunt outside the trapping-area. For this reason a mist-net should always be carried."

BIRDS--MORPHOLOGY, PHYSIOLOGY, BEHAVIOR, MIGRATION

Davis, David E. (Johns Hopkins Sch. Pub. Health, Balt. 5, Md.) RELATION OF "CLUTCH-SIZE" TO NUMBER OF OVA OVULATED BY STARLINGS. Auk 75(1): 60-66. Jan. 1958.
Summary: "The number of eggs ovulated by Starlings...was determined by serial sections of the ovary and compared with the number (clutch) of eggs in the nest box of each bird. For 32 birds the number of ovulations was the same as the clutch-size in only 7 cases. The ovulations were greater in 16 cases and smaller

in 9. A variety of causes can result in loss of eggs. An excess can result when 2 females lay in the same box. The fact that clutch-size is not necessarily an indication of number of eggs ovulated means that interpretations of the biological implications of changes or differences in clutch-size need to be examined carefully."

Eber, Gisela. (Zool. Forschungsinstitut & Museum Alex. Koenig, Bonn, Germany.) VERGLEICHENDE UNTERSUCHUNGEN ÜBER DIE ERNÄHRUNG EINIGER FINKENVÖGEL. Biol. Abhandlungen, Heft 13/14. 1-60 p., 11 figs. 1956. DM 2.50.
In German. Feeding habits, daily feeding rhythms, seasonal foods, and comparative anatomy of food-getting and digesting structures of German finches.

Elton, Richard Lloyd. THE PHYSIOLOGY OF THE AVIAN ADRENAL CORTEX. Ph.D. thesis, Purdue U. 161 p. 1957. [From long abstract in Dissertation Abstracts 18(1).]
Includes comparisons with adrenal physiology in other groups of animals.

Farner, Donald S., and A. C. Wilson. (State Coll. Wash., Pullman.) A QUANTITATIVE EXAMINATION OF TESTICULAR GROWTH IN THE WHITE-CROWNED SPARROW. Biol. Bul. 113(2): 254-267, 4 graphs. Oct. 1957.
Effects of day-length, light intensity, and environmental temperature were studied experimentally. A predicted growth curve was prepared from experimental data and compared with data from a natural population. The predicted curve indicated attainment of 100 mg. combined testicular weight about 10 days earlier than it actually appeared in nature. Possible explanations are discussed. Results emphasized the overwhelming importance of photoperiod as main timer of testicular cycle in birds studied. Other environmental factors appeared to cause "fluctuations with a combined maximum possible magnitude of the order of ten days or two weeks."

Fisher, Harvey I., and Lawrence M. Bartlett. (S. Ill. U., Carbondale.) DIURNAL CYCLES IN LIVER WEIGHTS IN BIRDS. Condor 59(6): 364-372, 1 graph. Nov.-Dec. 1957.
Pronounced declines of liver weights of redwing blackbirds and starlings occurred overnight in winter. Fat and glycogen content of liver was highest in early evening and decreased during night. Loss of weight of liver primarily represented decrease in stored fat.

Frantz, Wm. Lawrence. SOME FACTORS EFFECTING SPERMATOKINESIS IN THE TESTES OF THE QUAIL (COLINUS VIRGINIANUS) AND THE HOUSE SPARROW (PASSER DOMESTICUS). Ph.D. thesis, Ohio State U. 71 p. 1957. [From long abstract in Dissertation Abstracts 17(10).]
Experimental and histological study.

Frings, Hubert, and Betty Slocum. (Pa. State U., U. Park.) HEARING RANGES FOR SEVERAL SPECIES OF BIRDS. Auk 75(1): 99-100. Jan. 1958.
Upper and lower limits of hearing tabulated for 6 species, including Aythya valisineria, Phasianus colchicus, Columba livia, and Bubo virginianus.

Hamerstrom, Frances. (Wis. Cons. Dept., Plainfield.) THE INFLUENCE OF A HAWK'S APPETITE ON MOBBING. Condor 59(3): 192-194. May-June 1957.
A ♂ red-tailed hawk was most heavily mobbed by small birds when it was showing signs of hunger, when it was on high perches of its own selection, and when it was flying low.

James, Douglas Arthur. GREGARIOUS NOCTURNAL ROOSTING OF TURDIDAE, STURNIDAE AND ICTERIDAE IN EAST-CENTRAL ILLINOIS. Ph.D. thesis, U. Ill. 257 p. 1957. [From long abstract in Dissertation Abstracts 17(11).]
The several species roosted together, but were in different proportions in different roosts. Order of departure from the roost in the morning was robin, grackle, starling, cowbird, and red-winged blackbird; the sequence of afternoon arrival was the reverse. Birds traveled 16 mi. from the roost to feed in spring and autumn, less than 4 mi. in winter. Certain aspects of social behavior and relationships are described.

Kare, M. R., R. Black, and A. G. Allison. THE SENSE OF TASTE IN THE FOWL. Poultry Sci. 36: 129-138. 1957. [From Auk 75(1).]

Kenyon, Karl W., and Dale W. Rice. (US F&WS, Sand Point Naval Air Sta., Seattle 15, Wash.) HOMING OF LAYSAN ALBATROSSES. Condor 60(1): 3-6. Jan.-Feb. 1958.

18 albatrosses from Midway Atoll were released at various points in the N. Pacific. "Fourteen birds, representing all six localities, subsequently returned to their nests. The bird covering the greatest distance returned from the Philippine Islands, 4120 statute miles in approximately 32 days. The most rapid return was accomplished by a bird liberated at Whidby Island, Washington, which covered a rhumb line distance of 3200 miles in 10.1 days at an average speed of 317 miles per day." "We suggest that existing theories of bird navigation do not fully explain their homing behavior."

King, James Roger. BIOENERGETICS AND REGULATION OF VERNAL PREMIGRATORY ADIPOSITY IN THE WHITE-CROWNED SPARROW (ZONOTRICHIA LEUCOPHRYS GAMBELII). Ph.D. thesis, State Coll. Wash. 128 p. 1957. [From long abstract in Dissertation Abstracts 18(1).]

See also Proc. Soc. Exp. Biol. & Med. 93(2): 354-359, Nov. 1956.

Koskimies, Jukka. (Game Res. Inst., Unionink. 45B, Helsinki, Finland.) TERNS AND GULLS AS FEATURES OF HABITAT RECOGNITION FOR BIRDS NESTING IN THEIR COLONIES. Ornis Fennica 34(1): 1-6. 1957.

One of the most discussed questions of recent Fennoscandian waterfowl research is why many ducks, grebes, and shorebirds nest in colonies of gulls and terns. Some workers maintain that the reason is protection against predators, especially crows. Others maintain that the reason is simply social attraction. Koskimies believes that the habit originated because of the protection and is maintained by habit through something like imprinting of young on the larid-colony environment. In other words, "the biological (ultimate) cause of the phenomenon in question is the breeding-season protection of the ducks, grebes and shorebirds offered by this habit, while its immediate (proximate) cause is the releasing effect of the larids." Numerous references on the controversy are cited.

Larionov, V. F. THE EFFECT OF LIGHT ON THE MOLTING OF BIRDS. Biull. Eksptl. Biol. i Med. 39(10): 63-65. 1955. [From long abstract in Biol. Abs. 32(2), transl. from Referat. Zhur., Biol., 1956, no. 54693.]

In Russian.

Lowther, Malcolm A. (22599 N. Kane, Detroit 23, Mich.) STUDIES ON THE VERTICAL DISTRIBUTION OF BREEDING BIRDS WITH REFERENCE TO THE VEGETATION. Jack Pine Warbler 35(4): 119-124, 1 graph. Dec. 1957.

Work was done at U. Mich. Biol. Sta. near Cheboygan, Mich. Summary: "1. A study was made of the vertical distribution of breeding birds with reference to the vegetation. 2. The vegetation of the area was divided into definite vertical zones, and the birds were recorded in these zones by observing where they fed, sang, and escaped. 3. The conclusion was reached that there are definite vertical zones based on vegetational levels and that birds are distributed vertically in these zones." Data are tabulated for species.

Pitelka, Frank A. (MVZ, U. Calif., Berkeley.) TIMING OF MOLT IN STELLER JAYS OF THE QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA. Condor 60(1): 38-49, 7 figs. Jan.-Feb. 1958.

A detailed study. Pitelka concludes that molt is critically timed in relation to peak of summer foods just as much as is the period when parents are feeding young in the nest. Thus it is not safe to assume that the need of feeding young is the chief determinant of timing of life history events.

Scott, M. L., F. W. Hill, L. C. Norris, G. F. Heuser, R. E. Reynolds, E. H. Parsons, Jr., and H. E. Butters. (Cornell U., Ithaca, N. Y.) NEW INFORMATION ON THE VITAMIN A REQUIREMENTS OF CHICKENS, DUCKS AND PHEASANTS. Proc. 1957 Cornell Nutrition Conf. for Feed Manufacturers: 132-136. Nov. 1957.

Authors estimate that minimum requirement of vitamin A for White Leghorn hens is 1200-1600 I.U. per lb. of ration. This is enough for health and production. Levels of 5,000 I.U. or more per lb. of ration may improve performance of progeny

owing to higher carry-over of vitamin through egg to chick. Survival and performance of progeny were subnormal for hens fed 800 I.U. per lb. of ration. Progeny of all other lots showed satisfactory early growth and survival if fed 400-600 I.U. or more stabilized vitamin A per lb. of chick ration. "Ducklings and pheasants, the progeny of ducks and pheasant hens fed commercial rations, required 500 to 600 I.U. of vitamin A per lb. of starting ration, when this vitamin was supplied in the form of a commercial stabilized vitamin A supplement."

Swinebroad, Jeff. SOME ASPECTS OF THE ROLE OF WEATHER IN BIRD MIGRATION. Ph.D. thesis, Ohio State U. 330 p. 1956. [From long abstract in Dissertation Abstracts 17(11).]

Field studies on a reservoir in Ohio showed that light intensity affected the daytime activity of black ducks and mallards, the time and characteristics of evening flight of mallards, black ducks and diving ducks, and the long flights of shorebirds. Other factors affecting behavior were wind, passage of cold fronts, and the number of birds present. Numbers of shore birds were affected by the relative amounts of water and mud flats present at different times. Dunlins did not seem to be affected by weather changes. Laboratory tests on mallards showed that activity could be initiated and regulated by light intensity. Both field and laboratory work suggested that cyclic behavior of ducks may be related to cyclic activity of the gastrointestinal tract.

Tinbergen, N. (U. Mus., Oxford, Eng.) THE FUNCTIONS OF TERRITORY. Bird Study 4(1): 14-27. 1957. [From abstract by O. L. Austin, Jr., Bird-Banding 28 (4).]

"...reviews some of the recent thinking on avian territoriality and attempts to explain the importance of territorial behavior to specific survival. While acknowledging the survival value of site attachment...he emphasizes here the importance of the intraspecific hostility through which birds establish and maintain their territories. He argues in essence that while site attachment enhances the perpetual occupancy of favorable terrain and 'assures for the individual certain advantages of being where it is,' hostility is important as a highly efficient dispersal mechanism that prevents overcrowding, enhances range-extension, and assures the occupancy of the less desirable but nevertheless suitable sites. Pertinent and thought-provoking though the argument is, it still leaves much room for controversy. As the author points out, the factual evidence in support of his thesis 'is far from complete' and, I might add, its semantics still need clarification and simplification."

Turček, F. J. (Game Res. Inst., Banska Stiavnica, Czechoslovakia.) A BRIEF STUDY OF THE USE OF FOOD BY THE JAY AND THE CROSSBILL. Ornith. Mitt. 9: 9-11. 1957. [From highly informative abstract by R. O. Bender, Bird-Banding 28(4).]

In German. Quantitative study of acorn (jay) and pine seed (crossbill) consumption in relation to body size and energy production. Bender's abstract supplies many of the data. "Based on this limited study and on previous researches with mice, the author states that, at least with smaller mammals and birds, energy consumption is essentially constant per g. of body weight and moves around a value of 600 g-cal per g."

Vleugel, D. A. THE ORIENTATION OF HOMING-PIGEONS. Limosa 29(4): 129-137. 1956. [From abstract by O. L. Austin, Jr., Bird-Banding 28(4).]

In Dutch with English summary. "Reviews briefly the experiments of Heinroth, Matthews, Kramer, Nicol, Platt and Dare, Griffin, and Hitchcock, and comments on their contradictory findings. Vleugel agrees that the pigeons do seem to have some sort of 'navigational ability to fly in one particular direction,' probably by 'a form of sun navigation,' but on psychological grounds he 'thinks it impossible for pigeons to find the direction of their home by considering the sun-arc for some seconds after their release.' He considers the wide gap between the results of Matthews and Kramer and those of Heinroth and the Americans to be due to the terrain and ecological clues present in the former and lacking in the latter experiments. Still to be explained, however, is 'Why in Kramer's and Matthews' experiments off the training-line, a great number of the vanishing points lay in the direction of the home loft.'"

von Haartman, Lars. (Zool. Inst., U. Helsinki, Norra Jarnvagsgatan 13, Finland.) INFLUENCE OF TEMPERATURE ON BROODING RHYTHM. Ornis Fennica 33(3/4): 100-107. 1956. [From abstract by O. L. Austin, Jr., Bird-Banding 28(4).]

In German with English summary. Experiments with pied flycatchers (Muscicapa hypoleuca) in a thermostatically controlled nesting box showed that the temperature within the box influenced the brooding rhythm. The higher the temperature in the box, the shorter were the individual brooding periods. On the other hand, intervals between brooding periods were not affected by outside temperatures.

Wetherbee, David Kenneth. (11 Dallas St., Worcester, Mass.) NATAL PLUMAGES AND DOWNY PTERYLOSES OF PASSERINE BIRDS OF NORTH AMERICA. Am. Mus. Nat. Hist. Bul. 113(5): 343-436, illus. 1957.

## BIRDS--MANUALS, FAUNAS, COMMUNITIES

Bent, Arthur Cleveland. LIFE HISTORIES OF NORTH AMERICAN BLACKBIRDS, ORIOLES, TANAGERS, AND ALLIES. US Natl. Mus. Bul. 211. ix + 549 p. + 37 pl. 1958. $2.25, paper, from Supt. Documents.

This 20th volume of Bent's life history series brings a set of prime importance to within 1 volume of completion. The original manuscript was finished in 1949, but some recent references have been added. Like the earlier numbers, it is the product of contributions from many people. Well arranged masses of detailed information on life history, habits, and distribution are presented as interesting narratives that incorporate ample quotations from an extensive literature. The section on the English sparrow includes the story of its introduction and history in the U. S.--L. F. Stickel.

Bond, Richard R. (Salem Coll., Salem, W. Va.) ECOLOGICAL DISTRIBUTION OF BREEDING BIRDS IN THE UPLAND FORESTS OF SOUTHERN WISCONSIN. Ecol. Monog. 27(4): 352-384, 9 figs. Oct. 1957.

"The purposes of the present study were (1) to test the usefulness of this framework [the vegetational continuum concept] in analyzing bird communities; (2) to determine the relationship between bird distribution and a phytosociological gradient and, in so doing, to express quantitatively, rather than subjectively, avian habitat preferences; and (3) to determine the relationships among the breeding bird communities of the upland hardwoods forests of southern Wisconsin. The study consisted of counting and analyzing the breeding bird populations of 64 stands." "...no discrete groups of bird communities within the deciduous forest could be discerned; rather, a continuously varying series, or continuum, of bird communities was demonstrated between those of open, xeric deciduous forest stands and those of more dense, mesic stands."

Fraser, J. Keith. (Dept. Mines, Ottawa, Ont.) BIRDS OBSERVED IN THE CENTRAL CANADIAN ARCTIC, 1953, 1955, 1956. Can. Field-Nat. 71(4): 192-199. Oct.-Dec. 1957.

Annotated lists of birds seen "on Boothia Peninsula, in southeastern Victoria Island and on southern King William Island and Adelaide Peninsula..."

Knorr, Owen Albert. THE BIRDS OF EL PASO COUNTY, COLORADO. Ph.D. thesis, U. Colo. 147 p. 1956. [From long abstract in Dissertation Abstracts 17(11).]

Birds of the county in 1947-51 are compared with those reported by Aiken and Warren in 1914. Life zone and faunal affinities of present species are analyzed. Since 1914, birds associated with aquatic habitats have increased owing to increased water storage in the county. Certain passerine birds have increased in connection with plantings about dwellings. Decreases were noted for those species subject to hunting pressure or disturbance by grazing and agriculture. Other changes occurred which could not be explained.

Murray, Joseph James. THE BIRDS OF ROCKBRIDGE COUNTY, VIRGINIA. Va. Soc. Ornith., Va. Avifauna no. 1. 1-59 p., 1 map, proc. Dec. 1957. 50¢ paper, from F. R. Scott, 115 Kennondale Lane, Richmond 26, Va.

An attractively produced booklet based on 30 years of study. The county is scenic and diversified. It extends from the Blue Ridge across the Valley of Va. to outliers of the Allegheny Mtns. More than half the area is forested and about 15% cultivated. Bodies of water are small and few, but enough to attract

many species of water birds. In all, 264 species and subspecies of birds are known from the county. Murray discusses each in an annotated list. Status and abundance of each are mentioned, as is seasonal occurrence. Specific records are given for rare forms. Breeding records are given for many forms. Authoritative subspecific identifications are provided for numerous species of which more than 1 race does or may occur. For a few species, including raven, considerable information is provided on such topics as breeding sites, foods, or response to changing conditions. It is interesting to note that the raven is more common in recent years, and that pileated woodpeckers are not infrequently seen in the town of Lexington.

Root, Oscar M. (Brooks Sch., N. Andover, Mass.) THE BIRDS OF THE ANDOVER REGION. 4 parts. Bul. Mass. Aud. Soc. 41(9): 459-467, 2 figs., Dec. 1957. 42(1): 5-15, Jan. 1958. 42(2): 79-87, Feb. 1958. 42(3): 119-125, 1 photo, Mar. 1958.

Report on 16-year study of birds of 72-sq. mi. area around Andover, Mass. Introductory sections describe area, discuss conservation, where to find birds, changes in abundance of species since 1900, and give tabulation of Christmas counts for 1946-56. Concise annotated list provides data on status, dates of occurrence, and occasionally other matters for species.

Rustad, Orwin A. (Breck School, Minneapolis, Minn.) SURVEY OF THE BIRDS OF RICE COUNTY, MINNESOTA. Flicker 29(2 & 3): 43-63, 100-107, 110-118. June & Sept. 1957.

Discusses history of ornithology in county and presents annotated list. List gives data on status, seasonal occurrence, nest records, winter records, arrival dates, and related matters.

Salt, George Wm. (U. Calif., Davis.) AN ANALYSIS OF AVIFAUNAS IN THE TETON MOUNTAINS AND JACKSON HOLE, WYOMING. Condor 59(6): 373-393, 4 figs. Nov.-Dec. 1957.

Strip censuses were made of birds of several coniferous and deciduous habitats. Results were analyzed with much consideration of relationship of biomass to stage of succession. "It is suggested that avifaunal size and efficiency in energy metabolism may prove to reflect ecosystem functions accurately enough so that avifaunal characteristics may be used as indices of the metabolism and efficiency of the entire biotic community."

Smith, W. John. (40 Roslyn Ave., Ottawa 1, Ont.) BIRDS OF THE CLAY BELT OF NORTHERN ONTARIO AND QUEBEC. Can. Field-Nat. 71(4): 163-181, 1 map. Oct.-Dec. 1957.

Brief description and map of this huge region; annotated list with data on status, distribution, and abundance as observed in summers of 1953-54 and as commented upon by previous writers.

## BIRDS--POPULATIONS & FLUCTUATIONS

Bond, Gorman M., editor. TWENTY-FIRST BREEDING BIRD CENSUS. Aud. Field Notes 11(6): 436-458, 6 photos. Dec. 1957.

35 actual population censuses of breeding birds of areas from Nova Scotia to Chiapas. Most of them, however, are from e. U. S. and most of them pertain to wooded areas. Some of the plots have been censused for years.

Dennis, John V. (17 Liberty St., Nantucket, Mass.) ARE WARBLERS DECREASING? Parts I-III. Aud. Mag. 59(5): 210-213, 227, 3 figs., Sept.-Oct. 1957. 59(6): 278-281, 2 photos, Nov.-Dec. 1957. 60(1): 32-34, 2 photos, Jan.-Feb. 1958.

Warbler flights were far below normal at many points in 1956. One of these points was Nantucket Is., Mass., where author had been banding and studying migration for several years. In this 3-part article he discusses the wide variation in warbler numbers noted at various places in 1956, and considers possible causes. He also discusses at length banding work at Nantucket, and Nantucket in relation to bird migration. No particular conclusions about warbler losses are reached. The author does feel, however, that warblers are most affected by climatic events, and that mortality and breeding success are bound to vary from time to time, from place to place, and from species to species.

Warbach, Oscar. (Mich. Dept. Cons., Lansing.) BIRD POPULATIONS IN RELATION TO CHANGES IN LAND USE. J. Wildl. Mgt. 22(1): 23-28, 3 figs. Jan. 1958.

Changes in breeding-bird populations on a 210-acre farm area on the Patuxent Research Refuge in Md. were observed from 1947 to 1952. During this period, clearing, draining, and planting changed the area from a partially abandoned farm with only 34 acres in cultivation to a modern conservation farm. Number of bird species nesting in the area was about 10% lower in the last 3 years than in the first 3. Number of nesting pairs declined about 40%.--L. F. Stickel.

BIRDS--ECONOMICS, CONTROL, MORTALITY

Aldrich, John W. (US F&WS, Wash., D. C.) CONFLICT OF BIRDS AND AIRCRAFT AT MIDWAY. Aud. Mag. 60(1): 27-29, 35, 41, 3 photos. Jan.-Feb. 1958.

Species that causes most plane accidents is Laysan albatross. Individuals nesting near runways cause most accidents, but they cannot be frightened away from their nests and they home long distances if displaced. When hundreds were killed near runways, their places were soon taken by others. The bird is not common enough elsewhere to permit great reduction of the Midway population. Best idea at time of writing seemed to be leveling of ground for several hundred feet on each side of runways. This makes soaring hard for the birds and reduces attractiveness of an area. Sooty terns are abundant. They will cause much more trouble when jet planes use Midway. The bird is common elsewhere, so mass population reduction probably will be used at Midway.

Gilfillan, Merrill C. (Ohio Dept. Nat. Resources.) DOWN CAME A BLACKBIRD AND PECKED OFF AN EAR. Ohio Cons. Bul. 22(1): 10-11, 26-28, 4 figs. Jan. 1958.

Facts about the problem of blackbirds vs. corn. Based on work of Dr. Maurice L. Giltz, Agr. Exp. Sta., Castalia, Ohio. At fall peak, there are some 8 million blackbirds in Ohio, about 2 million each of red-wings, grackles, cowbirds, and starlings. Red-wings are the worst problem. At least 1 million of them roost in marshes of 4 counties and damage crops, chiefly corn, to extent of $200,000 a year. They may ruin whole fields and may cut farm income of an area by 5-6%. Buyers pay 15% less for corn where blackbird damage is common. Red-wings breed in hayfields and form vast flocks in late summer when corn is in the vulnerable milk stage. Fields near roosts may be taken over by swarms of birds. Various approaches to the problem are being tried and are mentioned here. A non-lethal control would be preferred. It is hoped that nothing need be done to make the roosting marshes of reduced value to other kinds of wildlife.

Johnston, David W. (Mercer U., Macon, Ga.) BIRD MORTALITY IN GEORGIA, 1957. Oriole 22(4): 33-39. Dec. 1957.

Tabulations and other information on migrating birds killed at lighthouses and broadcasting towers. Thousands of birds of scores of species were killed. Mortality at ceilometers was relatively light in 1957. Herbert Stoddard and Robert Norris are making major studies of heavy mortality at towers in their areas.

Johnston, David W., and T. P. Haines. (Mercer U., Macon, Ga.) ANALYSIS OF MASS BIRD MORTALITY IN OCTOBER, 1954. Auk 74(4): 447-458. Oct. 1957 [Jan. 1958].

Summary: "Between October 5 and 8, 1954, twenty-five instances of mass bird mortality were recorded in the eastern and southern United States. They occurred primarily at airport ceilometers, but also at radio and television antennae and tall buildings. An advancing cold front in the autumn is believed to have precipitated these mass mortalities by bringing together adverse weather conditions (especially a lowered cloud ceiling), nocturnal migrants, ceilometers and/or tall obstructions. More than 100,000 birds of 88 species were killed at the 25 localities during these three nights. The Oven-bird, Magnolia Warbler, Red-eyed Vireo, and Chestnut-sided Warbler were the most abundant species recorded at the sites. Most of the 88 species were common summer residents or transients at these localities, but a few supposed nonmigrants and winter birds were also killed. At Warner Robins Air Force Base, Georgia, the largest ceilometer kill in recorded history occurred on October 8, 1954: 53 species and an estimated 50,000 individuals were killed. From these, a sample of 2552 birds was examined.

Data on weight, sex, age, fat deposition, and subspecific determination are presented for many of the species. Weight variation among these fat fall migrants is believed to be due primarily to variation in fat deposits. Subspecies recorded in the kill indicate a convergence on this area by migrants from northeasterly, northerly, and westerly points."

Löhrl, Hans. CHERRIES AS FOOD FOR NESTLING STARLINGS. Ornith. Mitt. 9: 23-24. 1957. [From review by R. C. Bender, Bird-Banding 28(4).]
In German. This and other papers on pages 34 and 114 of same volume provide data on starling damage to and consumption of cherries.

MacLellan, C. R. (Sci. Serv. Lab., Kentville, Nova Scotia.) ROLE OF WOODPECKERS IN CONTROL OF THE CODLING MOTH IN NOVA SCOTIA. Can. Entom. 90(1): 18-22. Jan. 1958.
Summary: "The eastern hairy woodpecker and the northern downy woodpecker are both important in control of the codling moth in Nova Scotia. In the years 1950 to 1956 these birds reduced the overwintering larval population on tree trunks by 52 per cent. Woodpeckers find codling moth larvae by sight and touch. Searching is done at random with the woodpecker looking for likely spots for cocoons or locating the exact spot by tapping with the beak. After finding the larva, the woodpecker either flicks the bark off with its chisel-shaped beak and feeds on the exposed larva, or drills a hole through the bark into the cocoon and withdraws the larva with its barbed tongue."

Madsen, F. Jensenius. ON THE FOOD HABITS OF SOME FISH-EATING BIRDS IN DENMARK / DIVERS, GREBES, MERGANSERS, AND AUKS. Danish Rev. Game Biol. 3(2): 19-83. 1957.
In English. Based on analysis of stomach contents of 900 birds of following species: Gavia arctica, Gavia stellata, Gavia immer, Podiceps grisegena, Podiceps cristatus, Podiceps auritus, Podiceps nigricollis, Podiceps ruficollis, Mergus albellus, Mergus serrator, Mergus merganser, Cepphus grylle, Uria aalge, and Alca torda. Results are discussed in detail for each species and for each group. Notes are also given on diving habits and status in Denmark of each species. What is the economic effect of these birds? "The fishes which supply most of the food for the diving inshore fish-eaters in Denmark are the small shoal fishes, gobies and sticklebacks, which occur in innumerable swarms in the shallow coastal waters... These are also the fishes fed on by those diving ducks...which include a percentage of fish in their diet... This investigation clearly shows that the birds treated...primarily take their food from valueless kinds of fish... It is only when feeding inland that the fish-eating birds may be attributed any adverse influence on the fisheries of man, and it is really only when fishing e.g. in fish-ponds that the birds can be declared harmful. In their natural fresh-water habitats the fish-eating birds here treated feed on such fishes that their influence on the stock of fishes of commercial value can only be negligible."

Mann, W. F., Jr., and C. E. Kingsley. BIRD CONTROL IN FOREST NURSERIES. US For. Serv., S. For. Exp. Sta. (New Orleans), S. For. Notes no. 113. p. 1. Jan. 1958.
Sublimed anthraquinone seems to be best repellent for protecting seeds from birds. It has little or no effect on germination. Arasan and Arasan 75 are also good repellents but reduce germination by 5-10%. Best sticker is Dow Latex 512-R; second best is asphalt emulsion. The smooth latex surface allows seeds to feed through drill uniformly. Anthraquinone should be applied at rate of 15 lbs. per 100 lbs. of seed. Sticker is made by diluting 1 part latex to 9 parts water.

Neff, Johnson A., Brooke Meanley, and Ronald B. Brunton. RESEARCH ON BIRD REPELLENTS. PROGRESS REPORT NO. 3. PART 1. BASIC SCREENING TESTS WITH CAGED BIRDS AND OTHER RELATED STUDIES WITH CANDIDATE REPELLENT FORMULATIONS 1955-1957. US F&WS, Wildl. Res. Lab., Denver 2, Colo. ii + 19 p., 1 fig., mimeo. Nov. 1957.
Wild-caught caged birds were offered treated and untreated seeds in a variety of experiments. Effect of the treatments on seed germination was tested also. Additional experiments tested possible effects of the adhesive materials employed. Field screening supplemented laboratory studies. A narrative summarization discusses the effectiveness of 29 seed treatments. "In the field...when

the latter [clean natural foods] are abundant, almost any treatment may prevent bird attack upon seedings. As the supply of natural foods diminish, pressure increases, and when natural foods are sparse, seed must be protected by an effective repellent treatment." Several of the formulations reported on have significant repellency.--L. F. Stickel.

Pfitzenmeyer, Hayes T., Jr. LIFE HISTORY AND BEHAVIOR PATTERNS OF THE PILEATED WOODPECKER RELATIVE TO UTILITY LINES. M. S. thesis, Pa. State U. 1956. --P. F. English.

Thomas, H. F. (Irymple, Victoria, Australia.) THE STARLING IN THE SUNRAYSIA DISTRICT, VICTORIA. Emu 57: 31-48, 131-144, 151-180, 269-284, 325-337, 9 maps, 3 graphs, 1 pl. Mar.-Dec. 1957.

Economic and biological study made in district where starlings do much damage to important grape crops. The paper brings together both original research results and much data from literature. Major topics are: status of starling in Australia, survey of economic status of starling in world, distribution and concentration of starlings in various Australian habitats, appraisal of damage to grapes (as reported by growers), behavior of starlings in attacking growing and harvested grapes, detailed report on food habits (based on stomach analysis of 400 birds collected through year), estimated financial value of damage done to grape crop, survey of roost sites and roosting habits in the district, nesting and nest sites, sex ratios, weights, and measurements. Starlings eat large numbers of insects, but only 1 example was found of them controlling an insect pest. Ordinarily they do not seem to control even the insects on which they feed most heavily. They do, however, have an adverse effect on desirable (native) birds, and they may, as in Sunraysia, do severe damage to a fruit crop. Control is recommended, but control methods are not discussed in this paper.

White, H. C. (Biol. Sta., St. Andrews, New Bruns.) FOOD AND NATURAL HISTORY OF MERGANSERS ON SALMON WATERS IN THE MARITIME PROVINCES OF CANADA. Fisheries Res. Bd. Can., Bul. no. 116. viii + 63 p., 8 figs. 1957. 65¢ from Queen's Printer, Ottawa.

A major paper on economic status of Am. Merganser on salmon streams. Less information is given on red-breasted merganser and only a little is given on hooded merganser, as these 2 are of little importance to salmon because of their habits. The first section of the paper is a review, with original observations, of biology of Am. merganser: nesting, change in range, survival of young, molting, flight, methods of feeding, food consumption, etc. The second section is a detailed account of foods of 949 Am. mergansers from salmon streams of varied types. The third section discusses results. Of all fish eaten, salmon constituted 46-91% of the amount. Salmon were found in 45-96% of stomachs. On 1 good salmon stream, the Miramichi, a young merganser would take 1,584 salmon parr, among other fishes, before reaching full growth. Am. mergansers work streams until the streams are severely depleted, then move out. They can nearly clean a stream of fishes of edible size. The present control program, which consists of intensive hunting by trained men, is considered entirely necessary to preserve salmon runs at levels suitable for exploitation by man.

Wismer, Mrs. John F. (4436 Gratiot Ave., Port Huron, Mich.) MIGRATION MAYHEM. Jack Pine Warbler 35(3): 95-96. Sept. 1957.

Severe wind and hail storm on April 27, 1956 caused death of thousands of birds over Lake Huron. Some 2,000 birds were found dead on a 10-mi. strip of beach. 231 individuals found on a 1-mi. strip are listed by species. Some were as large as loons or herons but most were small.

York, Mrs. Olive R. (Elmira, N. Y.) ELMIRA'S NIGHT HERONS. Kingbird 7(3): 84. Oct. 1957.

A colony of black-crowned night herons in the city of Elmira, N. Y. made a great nuisance with filth and with noise at night. Shooting was protested, although legal permission for it was obtained. The colony was routed with fire hoses, apparently successfully. Existence of colonies of these birds in 2 other cities is noted.

BIRDS--PARASITES AND DISEASES

Jordan, Helen B. (Ga. State Coll., Atlanta.) HOST RESISTANCE AND REGULATION OF THE DEVELOPMENT OF PLASMODIUM LOPHURAE IN PHEASANTS, COOTS AND DOMESTIC PIGEONS. J. Parasit. 43(4): 395-408, 6 figs. Aug. 1957.

GAME BIRDS--GENERAL

Westerskov, Kaj. (Wildl. Div., Wellington, N. Z.) THE VALUE OF RENESTING IN GAME BIRDS. N. Z. Dept. Int. Affairs, Wildl. Publ. no. 8. 1-11 p., 5 figs. Reprinted from N. Z. Outdoor 22(6): 7-8, 25-26. Aug. 1957.

Figures given for N. Z., Europe, and U. S. show that as many as 2/3 pheasant nests in farm country are destroyed by hay mowing and that about half of the hens on these nests are killed. Hungarian partridges suffer heavily in same way. Yet 66% of pheasant hens in N. Z. are seen with broods--thanks to renesting. Renesting is conspicuous in countries having short breeding seasons, but inconspicuous in N. Z. where it is protracted. Pheasants are well adapted to renesting, being indeterminate layers and being able to renest without remating. Renesting staggers the season and ensures at least some breeding success. Predominance of ♀♀ doesn't hinder reproduction of the polygamous pheasant, but any marked deviation from even sex ratio could be serious in monogamous birds such as quail and partridge. Author's study of partridges in Denmark demonstrated that renesting helped restore sex ratio unbalanced by loss of hens to mowing. Chicks from early nests were 47% ♂♂ and 53% ♀♀, but from late nests there were 60% ♀♀. The shift was almost linear and was significant. Similar increase in ♀♀ with advance of season has been found in rabbits, rats, and chickens. This is not true of pheasants, however, judging from game-farm data. How much does renesting add to the fall population? Two European studies of partridge indicate addition of 25% and 36%. As for pheasants in N. Z., "With a nesting success of 50 per cent and 66 per cent of all hens managing to rear a brood, about 30 per cent of the hens are renesting; with a 40 per cent nest mortality about 60-65 per cent of all hens would renest." Renesting is more efficient in producing game birds on farmland than are any of our management efforts.

QUAIL

Campbell, Howard. (N. M. Dept. Game, P. O. Box 2060, Santa Fe.) FALL FOODS OF GAMBEL'S QUAIL (LOPHORTYX GAMBELII) IN NEW MEXICO. SW. Nat. 2(2/3): 122-128. April-July (Dec.) 1957.

Detailed report on food items in crops of 57 individuals collected Oct.-Dec. 1938-41 in Rio Grande drainage of N. M. "Summing up, four things appear outstanding, namely, (1) the extreme predominance of plant materials in the diet, (2) the special importance of legumes, chenopods, grasses, and composites, (3) the wide variety of plant species used to at least some degree, and (4) the versatility of the birds in heavily utilizing both wild and cultivated exotics now common in their environment."

Hamilton, Max. (Nebr. Game Comm., Lincoln.) WEIGHTS OF WILD BOBWHITES IN CENTRAL MISSOURI. Bird-Banding 28(4): 222-228, 1 graph. Oct. 1957.

Summary: "A study of the weights of central Missouri bobwhites was conducted from June 8, 1953, to June 18, 1954. During the period 360 weight records were obtained for 244 bobwhites. Juvenile quail attained the average weight of first-year-adults (174 grams) at about 100 days of age. Adult males were significantly heavier than first-year-adult males during January and February; adult females were significantly heavier than first-year-adult females during the month of January. All groups showed seasonal weight fluctuations: first-year-adults of both sexes were heaviest in January and lightest in March. Adults were heaviest in January. Males remained at a low weight throughout the breeding season, April through August, but during that period, females tended to regain the weight lost in February and March. Juvenile Missouri bobwhites averaged heavier than birds of the same age from the southeastern states. When the average weights of the bobwhites of all ages and sexes are lumped, the data recorded in the literature together with those obtained in this study show a progressive increase in weight from southern to northern United States, following Bergmann's Law."

Haugen, Arnold O. (Iowa State College, Ames.) QUAIL AND QUAIL FEEDERS. Ala. Cons. 29(3): 4-9, 4 figs. Oct.-Nov. 1957.

Value of self feeders for quail was tested from Feb. 1952 until Dec. 1954 on Flint Creek Island, Wheeler Nat. Refuge, Ala. Some of the 6-13 feeders were put in cover used by quail, others in covers not used. No evidence of predation at feeders was found. Feed for first 2 years was cracked corn. Feed in 1954 was high-protein turkey pellets. Pellets were not well accepted by animals. Corn was eaten or wasted by various kinds of animals, especially small birds, but quail ate only about 5% of it. Squirrels were kept from wasting corn by putting hardware cloth over openings of feeders. Animals used av. of 21.3 lbs. (79¢) corn per feeder per month. Use of feeders by wildlife rose from low in Oct.-Nov. to peak in March. Feeders were used least Sept.-Oct. Quail populations were followed carefully. They were not increased by feeders, as shown by numbers before, during, and after feeding. Feeders did not induce quail to utilized unused cover. They did not increase size or number of coveys. They did not alter the effective carrying capacity of the island. Feeders are no cure-all for poor habitat. They may, however, have some value where quail cover is adequate but food is scarce.

Kirkpatrick, Charles M. (Purdue U., Lafayette, Ind.) BOBWHITE WEIGHT GAINS ON DIFFERENT LIGHT-DARK CYCLES. Poultry Sci. 36(5): 989-993. Sept. 1957.

Summary: "When young bobwhite quail were placed on continuous artificial light or on different light-dark cycles with dark periods ranging from 12-36 hours alternated with 12 hours of artificial light, the weight gain of 12-36 group was greatest, followed in order by the 12-12, 12-30, 12-24, and continuous light groups. The birds on long dark periods consumed quantities of feed during the dark periods with the result that the hourly average feed intake per bird for all periods was virtually equal in all groups. The evidence indicates that when food is present, the absence of light over relatively long periods does not prevent satisfactory weight gains, and that some darkness is beneficial to growth."

Ripley, Thomas H., Russell A. Cookingham, and Robert P. Corrinet. (V.P.I., Blacksburg, Va.) BLACK LOCUST FOR QUAIL IN MASSACHUSETTS. J. Wildl. Mgt. 21 (4): 459. Oct. 1957.

Seed of Robinia pseudoacacia was main winter food of 65% of coveys in Barnstable, Mass., area for 3 years. Quail even tore open pods on trees. Locust stands with understory of Lonicera tatarica were preferred, probably because of openness at ground level. This habitat was also much used by woodcock. The combination of black locust and tatarian honeysuckle is worthy of serious testing as a management tool.

Schemnitz, Sanford D. (Okla. State U., Stillwater.) THE SCALED QUAIL OF WESTERN OKLAHOMA. Okla. Wildl. 13(11): 8-9, 12, 4 photos. Nov. 1957.

Popular article based on research. This quail occurs in parts of 17 counties of w. Okla. and throughout Cimarron Co. It maintained numbers through drought of 1954-56. Water did not seem to be limiting factor. Various fall foods are listed. Nests were well hidden. Clutches av. 12.7. Predation was not important. 1167 birds were banded and 30 bands were returned. Travels av. 2 mi. from banding site, with extreme of 6.5 mi. Coveys in winter were restricted to areas of about 60 acres, the winter homestead areas. Natural and artificial cover was used both summer and winter. A management method worthy of trial is to supply new and well distributed cover in the form of brush piles, pole brush shelters, board and post piles, or junk or car bodies in odd spots.

Stanford, Jack A. (Mo. Cons. Comm., Jefferson City.) A PROGRESS REPORT OF COTURNIX QUAIL INVESTIGATIONS IN MISSOURI. Trans. 22nd N. Am. Wildl. Conf. p. 316-359. 1957.

Objectives, viewpoints, and research results of Mo. Cons. Comm. concerning Coturnix. Includes literature review and Mo. findings concerning many phases of biology, reproduction, and management. Subjects: taxonomy, hatchery care and production techniques, weights of Coturnix and bobwhite in hatchery and in wild, growth, calls, field behavior, foods and feeding habits, nesting, migration, habitat, sporting qualities, plumages and molts, techniques for aging and sexing. Many of these data are summarized in appendixes. Coturnix seem to be very similar to bobwhites in habitat needs, food, and feeding habits. In dry seasons in

its native range, Coturnix fails to breed over wide areas. These and other facts lead author to believe that Coturnix should not be endorsed for stocking until more experimental studies have been made. "Will the Coturnix quail use the sparsely covered areas that no longer support huntable populations of bobwhite... or will the bird seek out those sites or areas possessing the best bobwhite habitat today? ...Will the Coturnix's presence produce an unfavorable interspecific reaction with bobwhite populations? If interspecific competition or stress occurs, in what bird's favor will lie the results?"--L. F. Stickel.

Wint, George B. (Okla. Game Dept.) A PRELIMINARY REPORT ON THE JAPANESE STUBBLE QUAIL IN OKLAHOMA. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 295-301. 1957.

The state plans to release at least 50,000 Coturnix a year until success or failure is demonstrated. Private groups are rearing and releasing around 25,000 a year. Wholesale propagation is simple. Coturnix are excellent for field trials; they will continue to be reared for that whether they become established in the wild or not. The birds seem to adjust well when released. No heavy mortality is noted but the birds soon vanish. No nests have been located. The birds apparently do disperse, but no pattern is yet apparent. Hunters find Coturnix satisfactory game, but not equal to bobwhite. American Coturnix have come from various introductions, and not all origins can be traced. It is possible that many or all are from the domesticated strain kept by Japanese for egg production, and hence not well adapted to life in the wild. Author quotes a few comments on habits and hunting of Coturnix in its native lands.

## PHEASANTS

Carney, Samuel M., and George A. Petrides. (US F&WS, Jerome, Idaho.) ANALYSIS OF VARIATION AMONG PARTICIPANTS IN PHEASANT COCK-CROWING CENSUSES. J. Wildl. Mgt. 21(4): 392-397. Oct. 1957.

Summary: "Pheasant cock-crowing counts made by groups of people selected with no regard for their previous experience at counting showed very poor agreement. Cock-crowing counts made by two experienced counters were generally higher and agreed among themselves more frequently than did counts of four inexperienced people. The elimination of one participant who showed an obvious lack of ability at counting tended to improve the agreement among counts of remaining participants. Variation among counters was no greater at stations with interference present than at stations where it was absent. Three groups making single-species call counts obtained markedly greater agreement among themselves, regardless of the species, than did one group counting simultaneously but attempting to count the calls of three species."

Cheatum, E. L., James R. Reilly, and S. C. Fordham, Jr. (N. Y. Cons. Dept., Albany.) BOTULISM IN GAME FARM PHEASANTS. Trans. 22nd N. Am. Wildl. Conf. p. 169-178, 1 fig. 1957.

In summer of 1955, a severe botulism outbreak occurred at Delmar Game Farm near Albany, N. Y. Symptoms and methods of diagnosis are discussed. Primary source of toxin was believed to be blow-fly larvae. Preventive measures: strict sanitation, feeders that prevent scattering of feed, float-type watering devices to prevent spillage, and reduction of escape cover in pens. Value of antitoxin is discussed. In the same year, an outbreak of botulism occurred on Grenadier Is., N. Y. where 20,000 pheasants were released. In the latter outbreak, certain non-game birds also were affected. In retrospect, the authors suspect that small outbreaks of undiagnosed botulism have occurred previously on game farms in N. Y. --L. F. Stickel.

Hart, Chester M. (Calif. Dept. Game.) CONTROLLED PHEASANT HUNTING AREAS IN CALIFORNIA. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 256-264. 1957.

Controlled pheasant hunting has expanded rapidly in Calif. since 1949. More than 500,000 acres were under the 3 main types of controlled hunting in 1956. Hunter-farmer problems have diminished although hunting has grown. Competition for hunting rights has increased. In consequence, areas under the Department's cooperative program have dropped sharply. The largest system is now the community hunting area program; fees are used for community projects. Growing

steadily is trend toward leasing rights to best pheasant habitat to private hunting groups, for monetary returns are highest. In short, hunting pressure is leading us toward the Old World system of private preserves and hunting leases.

Hewitt, Oliver H. (Cornell U., Ithaca, N. Y.) EXPERIMENTAL USE OF RESERPINE TO CONTROL CANNIBALISM AMONG RING-NECKED PHEASANTS. N. Y. Fish & Game J. 4(2): 228-233. July 1954 [Jan. 1958].

Abstract: "Reserpine was fed to 2-week-old pheasants held in battery brooders for a period of 2 weeks, in concentrations of 5 and 7 milligrams per kilogram of food. Both picking and scalping were effectively reduced. The groups fed reserpine ate slightly less food but gained slightly more weight than the controls."

Hewitt, Oliver H., and Richard E. Reynolds. (Cornell U., Ithaca, N. Y.) TRANQUILIZERS IN REARING GAME BIRDS. Proc. 1957 Cornell Nutrition Conf. for Feed Manufacturers: 53-60, 4 photos. Nov. 1957.

"The experiments reported on here indicate that a low level of reserpine in the diet of ring-necked pheasants may be of value in preventing fighting among cocks in breeding condition and in reducing the incidence of feather picking among juveniles during the rearing period. It cannot be recommended in the diet of breeding hens, because it depresses ovulation and reduces fertility and hatchability of eggs. There is need of further investigation on lower levels of administration of reserpine, and on the effects of other types of ataraxic drugs alone and in combination."

Reynolds, Temple A. (Box 326, Murray, Utah.) THE EFFECTS OF HUNTING SEASON LENGTH ON COMPARABLE PHEASANT POPULATIONS. M. S. thesis, Utah State Agr. Coll. 45 p. 1957.

In a study of pheasant season length, there was found no field evidence to show why pheasant seasons in either Cache Co., Utah, or Franklin Co., Idaho, should be held to their present lengths of 5 and 15.5 days respectively. Considering the comparableness of the pheasant populations, first week-end hunting pressures, and harvest in Cache Valley study areas, it appears doubtful that lengthening seasons would materially increase harvests.--Jessop B. Low. [For publication see WR 88: 67.]

Robeson, Stacy B. (N. Y. Cons. Dept.) COMPARATIVE CHANGES IN PHEASANT BROOD NUMBERS AND BROOD SIGN ON THE SAME AREA. N. Y. Fish & Game J. 4(2): 237. July 1957 [Jan. 1958].

Numbers of pheasant broods on a 3,500-acre study area in Monroe Co., N. Y., were estimated each year, 1951-53. Also, such signs of broods as tracks, droppings, dust baths, and feathers, were sought along 70 mi. of borders each summer. Estimated numbers of broods declined 24.7% and 25.0% (from 1951 to 1952 and from 1952 to 1953). Signs, however, declined 35.8% and 45.6%. "In both cases, a progressive decline was evident. But the degree of change indicated by the sample data [signs] was considerably greater than that shown by the actual population estimates."

Robeson, Stacy B. (N. Y. Cons. Dept.) PHEASANT NESTING SUCCESS ON AN AREA IN WESTERN NEW YORK. N. Y. Fish & Game J. 4(2): 235-236. July 1957 [Jan. 1958].

A 900-acre tract in Monroe Co. was studied in May-June of 1953. The area was an intensively farmed part of Ontario plain. Only about 7% of land was in safe nesting cover. Many nests were in crops and subject to disturbance. 24 nests were found. Only 3 (12.5%) were successful. Half of all nests were broken up by mowing, a quarter by plowing. This success seems very low, but its reality is suggested by counts of hens and broods made 1951-53 in 3,500-acre tract of same county. On av., there were only 20% as many broods as hens. And in 1953, when known nesting success was 12.5%, there were only 14.6% as many broods as hens.

Wagner, Frederic H. (Wis. Cons. Dept., Madison.) LATE-SUMMER MORTALITY IN THE PHEASANT HEN. Trans. 22nd N. Am. Wildl. Conf. p. 301-315, 4 figs. 1957.

The hypothesis that annual, winter sex-ratio changes in 2 unshot Wis. areas are due to annually varying, differential loss of hens is supported by a significant correlation between sex ratios and survival rates. Pelee Island hen age

ratios are inverse to yg.-per-hen ratios calculated from cock age ratios and sex ratios. Total-population age ratios on unhunted U. of Wis. Arboretum are inverse to population trends. That these two aberrancies are caused by bias created by annually varying, postnesting hen loss is supported by an inverse correlation between age ratios and survival rates. Wis. and Mont. brood observations, which show the % of broods without hens increases from July to fall, suggest the same. This loss seems to be linked with the hen's physiology, which is at its annual low at this season because of the stresses of breeding and molt. The fact that the loss is higher in late nesting years may be a result of increased stress of larger numbers of eggs laid. Late summer loss appears to bias age ratios enough to result in erroneous conclusions if not allowed for. Fall-to-spring loss may be fairly constant between years, and variations in annual survival rates may result largely from variations in spring-to-fall loss. Insecure nesting cover not only may reduce productivity, but also may increase hen loss owing to increased stress of greater renesting effort. High densities may act toward population control, not only by lowering productivity through nest abandonment as Stokes suggests, but also by increasing hen loss through added stress of higher egg production.--Author.

Westerskov, Kaj. (N. Z. Wildl. Div., Wellington.) PRODUCTIVITY OF NEW ZEALAND PHEASANT POPULATIONS. N. Z. Dept. Int. Affairs, Wildl. Publ. no. 40B: 1-144, 18 figs., 4 pl. 1956 [Received Mar. 1958].

Detailed research report that discusses many aspects of pheasant biology and includes much comparative information. The book's breadth of treatment is indicated by its 45 tables, 5-p. list of references, and 7-p. index. "In this bulletin are discussed the innate and external factors affecting the productivity...; comparisons are made with overseas populations. Detailed studies are made of sex and age ratios, extent of breeding season, clutch-size, egg fertility, and brood mortality. The reproductive rate...is found to be low. The sex ratio...is almost even, making the bird nearly monogamous. The population turn-over period is five years, probably highest in hens. Nests are placed in scrub, hay-fields, roadsides, pastures and swamps. The breeding season is from late July to late March with most nests being established during October-December. Clutch size is influenced by age of hen, subspecies, and latitude; average clutch-size...is nine, which is an adaptation through natural selection to the optimum number of offspring which may be reared. There is no decrease in clutch-size with advance of season as in North America. Egg fertility is the same in one, two and three year old hens, decreases with increasing number of hens per cock, and is highest during the peak nesting period. Nest mortality is high, particularly in hay-fields and roadsides where two-thirds are destroyed, mainly by mowing. Many sitting hens are killed. Of all hens surviving the nesting season two-thirds manage to bring off a brood. Brood mortality is very high; the average brood drops from eight at hatching to three or four at 12 weeks when birds generally disperse." The population is low, but as high as the present habitat can support.

## GROUSE, PARTRIDGE, ETC.

Beck, John V. THE GREATER PRAIRIE CHICKEN IN HISTORY. Nebr. Bird Rev. 25 (1): 8-12. Jan. 1957.

Discusses early data on this bird and concludes that the prairie chicken was scarce in presettlement days and increased only when cultivation began to vary the country. Also discusses migration in Nebr. and future of the species in Nebr.

Bohl, Wayne H. (N. M. Dept. Game.) CHUKARS IN NEW MEXICO 1931-1957. N. M. Dept. Game & Fish, Bul. no. 6. iv + 69 p., illus. 1957.

An informative, attractive bulletin on Indian and Turkish chukars in N. M. It tells of introductions into different habitats of N. M., census techniques, differences between the subspecies, sexing and aging techniques, and mortality factors. It also provides a long review of life history and dispersal, and makes recommendations for conduct of further releases. For informative review of somewhat more detailed publication on which this one is based, see WR 90: 65.

Bossenmaier, Eugene F. (Game Branch, Winnipeg 1, Manitoba.) THE STATUS OF THE CHUKAR PARTRIDGE IN WYOMING. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 234-238. 1957.

Reviews history, status, and habitat of chukar in Wyo. Releases have been made for 23 years but firm establishment has occurred only in the Big Horn Basin. There hunting was done successfully in 1955 and 1956. Consideration of chukar habitat in Wyo. and elsewhere leads to conclusion that success in Big Horn Basin resulted from excellent interspersion of native summer range and man-made winter range. Few if any other areas in Wyo. offer this combination.

Bryan, George A., Jr. A STUDY OF THE RUFFED GROUSE (BONASA UMBELLUS) IN THE BARRENS OF CENTRE COUNTY, PENNSYLVANIA. M. S. thesis, Pa. State U. 1957.--P. F. English.

Chambers, Robert E. THE RUFFED GROUSE IN THE BARRENS OF CENTRE COUNTY, PENNSYLVANIA. M. S. thesis, Pa. State U. 1956.--P. F. English.

Cowan, Archibald B., and Tony J. Peterle. (U. Mich., Ann Arbor.) LEUCOCYTOZOON BONASAE CLARKE IN MICHIGAN SHARP-TAILED GROUSE. J. Wildl. Mgt. 21(4): 469-471, 1 graph. Oct. 1957.

157 blood smears were obtained from 126 Pedioecetes phasianellus trapped in Upper Peninsula during winters and early springs of 1951-54. Leucocytozoon bonasae was found in 67% of these smears. However, only 31% of smears taken Dec. through Mar. were positive as compared to 95% of those taken April and May. Intensity of infection was also markedly higher in the latter sample. Occurrence of infection in 95% of smears made from spring-trapped birds (which composed approximately 50% of total sample) was considered representative of incidence of infection in entire population sampled. Thus, late fall and winter surveys may disclose as low as one-third the actual occurrence of infection. Since a high rate of infection was found in the potential breeding population, it seems important that the effects of L. bonasae on chicks be thoroughly investigated.--Authors.

Dorney, Robert S. (Wis. Cons. Dept.) RUFFED GROUSE ROOSTS AS A SPRING-CENSUS TECHNIQUE. J. Wildl. Mgt. 22(1): 97-99. Jan. 1958.

Winter roosts (indicated by fibrous droppings) of ruffed grouse were counted on 1/50th-acre plots in spring of 1957 on 2 areas in Wis. On 1 area, characterized by extensive forest cover, this technique appeared to be efficient in terms of manpower and provided a usable population index. In the other area, where oak woods were interspersed with farm fields, it did not provide reliable results.--Author.

Dorney, Robert S., Donald R. Thompson, James B. Hale, and Robert F. Wendt. (Wis. Cons. Dept.) AN EVALUATION OF RUFFED GROUSE DRUMMING COUNTS. J. Wildl. Mgt. 22(1): 35-40, 2 figs. Jan. 1958.

Two census techniques for providing ruffed grouse population indices on statewide areas were evaluated in Wis. The first of these techniques, the drumming count, was evaluated by comparing a drumming total on a 15-stop transect with the actual number of territorial ♂♂ present. These data were collected on 2 study areas for a period of 2 and 3 years. The standard deviation of the drumming counts on these transects was 10%. Three variables, the percentage of cocks that failed to drum, av. time interval between drums, and population density of cocks were found to be unimportant in biasing drumming count results. It was therefore concluded that the drumming count provided an efficient and reliable index of the breeding population. Drumming count results for 1951-56 were then compared to winter flush counts made in these years in Feb. and Mar. A strong correlation between these 2 independent indices was found ($r = .96$). Since winter flush data are gathered incidental to required deer management surveys, it appears that winter flush counts are a reliable and inexpensive tool for predicting ruffed grouse population levels.--R. S. Dorney.

Farmes, Robert E. (Minn. Div. Game, Thief River Falls.) SHARP-TAILED GROUSE IN MINNESOTA. Flicker 29(3): 92-94. Sept. 1957.

Brief, general article on habitats, distribution, results of releases, use of spring road counts to follow population trends, need of habitat management, research needs, and possible means of conservation. Sharp-tail habitat is disappearing in Minn. Management areas should be established at once. There is state-owned land that could be used if there is enough public desire for such use.

Frary, Ladd G. (N. M. Dept. Game.) EVALUATION OF PRAIRIE CHICKEN RANGES. N. M. Dept. Game & Fish, Completion Rep. Project W-77-R-3. 1-81 p., 27 figs., proc. [1957.]

Lesser prairie chickens in N. M., for the most part, are confined to the sandhills or "Shinnery range" and sand plains. Detailed vegetative survey data are given. Observations were made on 17 management areas in which 31 smaller units were developed by one or more of the following: feeders, brush shelters, food plots, or cover plantings. Quail were the only game species known to use the brush shelters. Feeders were used only by quail and dove and non-game species. Food plots received limited use and it was recommended that their planting by the game department be discontinued in favor of a crop purchase plan with farmers in years and localities of need. Fire was believed to have little value as a management tool. The author believes that non-grazed restoration tracts are the most important features in the N. M. restoration program. Life history data are summarized from the literature with added notes on observations in N. M. Crop contents of 17 individuals are reported. Inventories showed the highest male bird density to be 8 birds per section. Av. number of booming prairie chickens on 67 grounds was 7.6 in 1954, 8.6 in 1955, and 11.2 in 1956. For reliable trend data, it is recommended that booming surveys be made on specific areas every 2 years.--L. F. Stickel.

Greenhalgh, Clifton M. (Utah Dept. Game.) SEESEE PARTRIDGE. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 277-279. 1957.

Habitat for this bird (Ammoperdix) is limited in Utah and already occupied by Gambel quail. Utah therefore has little interest in the seesee. The seesee is less than half as big as a chukar. It has not bred well in captivity despite special facilities.

Gullion, G. W., and C. W. Crunden, editors. (Nev. Game Comm.) WESTERN STATES SAGE GROUSE QUESTIONNAIRE. No. 3: iv + 27 p., 2 maps, 2 figs., mimeo., 1956. No. 4: iii + 27 p., 2 maps, mimeo., 1957. "Not for Publication."

These annual reports are essentially working exchanges of facts and opinion on status of sage grouse and methods of study and management. Comments from the cooperating states and provinces include hunting statistics and available biological data. Maps show areas open and closed to hunting. Other maps show status and distribution of populations. Maps for both years indicate that sage grouse were increasing or remaining steady in most of range. Areas of increase appeared to be more extensive in 1957. The Washington State population was reported declining in 1956 but holding steady in 1957.--L. F. Stickel.

Hamerstrom, F. N., Jr., Oswald E. Mattson, and Frances Hamerstrom. (Wis. Cons. Dept.) A GUIDE TO PRAIRIE CHICKEN MANAGEMENT. Wis. Cons. Dept., Tech. Wildl. Bul. no. 15. 1-127 p., 15 figs., 42 unnumbered photos, 5 unnumbered maps. 1957.

Detailed management monograph based on long research. Conditions in Wis. are given most attention, but other areas are discussed. Principles should apply to entire range of bird. Chief topics are: past and present distribution in Wis., seasonal habitat requirements, managing land for prairie chickens, and how hunting should be regulated at different population levels. Appendices give much information on habitat conditions in relation to chicken populations and management. Prairie chickens increased with early agriculture and deforestation. They declined--and are still declining--with intensified agriculture and reforestation. They now need special land management to persist. For one important area, Buena Vista Marsh, authors recommend that management should consist primarily of: "(1) establishment of a scatter-pattern of grassland reserves--i.e., permanent nesting and rearing areas--amounting to about one 40 per section and totalling about 3,200 acres, (2) maintenance of these areas in good condition and (3) continuation of the present food-patch system; secondarily of (4) improvement of other lands throughout the Marsh, as far as practicable, and (5) maintenance of booming ground cover and of winter cover." Hunting must be regulated to fit the surplus. Exotics should not be stocked in prairie chicken areas. Strong habitat is best defense against predators and severe weather. Spread of disease can be discouraged by dispersing winter food supplies. "It would be extremely important to learn just how far apart good pasture management and good prairie chicken management really are, to see whether the difference could be bridged by a moderate subsidy."

Harper, Harold T., Beverly H. Harry, and Wm. D. Bailey. (Calif. Dept. Game.) THE CHUKAR PARTRIDGE IN CALIFORNIA. Calif. Fish & Game 44(1): 5-50, 14 figs. Jan. 1958.

Long, important paper. Chukars were released in 54 of California's 58 counties and became established in large areas of desert and semidesert. Life history and management were studied on 2 of best areas. Pairing occurred Feb.-Mar. and peak of hatch was in May-June. Av. clutch was 11-12 eggs. Broods probably mixed after young were 3 weeks old, so reproductive success should be determined from summer age ratios. Moister years appeared to favor reproduction. Predation was not very significant. Few nests were where farming interfered. Chukars seldom were found more than 1 mi. from water in summer but dispersed after fall rains began. They occurred at all altitudes to 12,000 ft., but tended to move below snow line. Food habits studies in 2 areas revealed Russian thistle, grasses, red-stemmed filaree and fiddle-neck to be major foods. No serious competition with native game was found. Little crop damage was reported. Many chukars were trapped with water and grain baits; most were stocked in new areas. Releasing by free-fall from plane was successful. Hunting success was low owing to rough terrain; probably less than 10% of chukars were shot; overshooting is hardly a problem. Returns of banded birds, especially those from game farm, were low. Management is mainly a matter of regulating kill, stocking new areas, and putting in water developments. Guzzlers should be large enough, and are most used if installed on ridges or benches where several large canyons join. Guzzlers on flats are little used by game even if in good cover.

Hatter, J. (B. C. Game Comm., Vancouver.) SOME REQUIREMENTS OF A MANAGEMENT PROGRAM FOR UPLAND GAME BIRDS IN BRITISH COLUMBIA. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 239-250, 3 figs. 1957.

Hatter discusses cycles and management of B. C. gallinaceous birds. Kills of recent years provided the basic data presented here. Hunting pressure is so low that a chief aim is to increase it. Under this condition, kill figures are adequate basis for regulating harvest, and aside from regulating harvest, little management is justified. Cyclic species should be hunted heavily before and during population peaks, and hunting should be permitted during lows. Ruffed grouse populations should be studied over period of high densities on areas of light and heavy hunting. Access to hunting areas, especially private land, should be improved. Good hunting spots and abundant species should be publicized.

Höglund, Nils H. INSTINCTIVE ACTIVITIES IN CAPTIVE SWEDISH TETRAONIDAE IN CONNECTION WITH MATING. Viltrevy 1(3): 225-232, 1 fig. Dec. 1957.

In Swedish with long English summary. Describes mating behavior in capercaillie, black grouse, hazel grouse, and willow grouse. Discusses hybridization between these birds in relation to behavior.

Hungerford, Kenneth E. (U. Idaho, Moscow.) EVALUATING RUFFED GROUSE FOODS FOR HABITAT IMPROVEMENT. Trans. 22nd N. Am. Wildl. Conf. p. 380-394, 3 figs. 1957.

Food habits of ruffed grouse broods were analyzed by a "food index" based on utilization and availability. Dropping analysis was used for utilization, and series of plots on feeding sites gave availability figures. Results were computed for 30 brood ranges by 2 week periods for 4 seasons. Dutch white clover, Kentucky blue grass, and a wide range of other plants bearing succulent leaves appeared to have high value as a group; any one of them could replace the others, depending upon availability. In applying these results to management, 2 steps were taken in experimental habitat improvement. First, seedings of Kentucky blue grass and Dutch white clover were made on evening feeding areas. These two species were used because of easily available seed and known cultural practices. A second experiment was the construction of small enclosures to protect other food plants from over-use and trampling by livestock.--Author.

Jackson, A. S. (Texas Game Comm.) SPANISH RED-LEGGED AND SEESEE PARTRIDGE INTRODUCTIONS IN THE TEXAS PANHANDLE. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 291-294. 1957.

263 seesees were released in Palo Duro Canyon. They dispersed and nothing was learned about them. Red-legged partridges were released at various times and places. Some were killed by avian predators, some flew into power lines.

Some apparently became established, but traveled widely to and fro rather than staying in 1 area. Observations and study of droppings indicated little competition and no friction with scaled quail. Red-legs feed more on greens and frequent more open, barren areas. They like to roost under ledges of eroding gullies; knowledge of this habit aids in locating red-legs.

Jackson, A. S., Richard DeArment, and Janey Bell. RELEASE OF THE REDLEGS. Texas Game & Fish 15(12): 16-17, 26-27, 3 photos. Dec. 1957.

Informal report on studies of Spanish red-legged partridges in Texas. First shipment was received Feb. 1955. Birds were quiet at first but soon became wild and panicked easily in their pens. They ate grains and much green vegetation. They drank and bathed, so perhaps need water. Cold rain had no ill effect. Releases were made in Panhandle counties of Cottle and Lipscomb where country and land use were varied. Some birds were lost to a flight of migrating hawks. Others dispersed widely. Partridges of second shipment remained docile. Their release was followed by drought and dust storms. The birds stayed close to winter grain fields and did not compete with native species. No increase occurred in first year. This was attributed to too much handling, moving, and medication. Partridges released in 1956 concentrated in 3 areas of good nesting cover and soon had broods. They preferred lotebush for cover and preferred bases of small escarpments and rims of draws for roosting. None was known to have traveled more than 6 miles. After nesting, they gathered into 1 flock of about 30 birds; the flock was still intact in Dec. 1956.

Jenkins, David. THE BREEDING OF THE RED-LEGGED PARTRIDGE. Bird Study 4(2): 97-100. 1957. [From abstract by O. L. Austin, Jr., Bird-Banding 28(4).]

"Observations made on a British game preserve of the conjugal relationships of this apparently promiscuous species (Alectoris rufa), in which 'sometimes both the cock and hen of a single pair incubate separate clutches.' Evidence shows one hen pairing with two cocks and laying three clutches; another hen paired with two cocks, one of which was already mated to a different hen. 'There was sometimes considerable mixing of broods; adults with broods were not antagonistic towards other adults.' One wonders how much of this sort of behavior is normal, and how much of it aberrant, perhaps induced by the unnatural conditions on a highly successful game preserve where predators and other natural checks and balances are eliminated and the birds are induced to breed in much closer proximity to one another than they normally would in an open 'unpreserved' range."

Johansen, Hans. (Zoologisk Museum, København, Denmark.) RASSEN UND POPULATIONEN DES AUERHUHNS (TETRAO UROGALLUS). Viltrevy 1(3): 233-266, 7 photos, 1 map. 1957.

In German with German and Swedish summaries. Taxonomic study of capercaillie throughout its range.

Kirsch, Leo M. SPRING GROUSE CENSUS AND HABITAT INVENTORY METHODS. US F&WS, Branch of Wildl. Refuges, Wildl. Mgt. Ser., Leafl. no. 13. 7 p., 2 figs., proc. Feb. 1956.

How to census sharptails and prairie chickens by use of booming-ground data.

Kleinschnitz, Ferd C. (Colo. Dept. Game.) HISTORY OF THE INTRODUCTION OF THE SPANISH RED-LEGGED PARTRIDGE IN COLORADO. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 280-282. 1957.

Discusses releases to date and quotes Bump's summary of the biology of this bird in Spain.

Klett, Albert T. (N. Dak. Game Dept., Bismarck.) BANDING AND MARKING METHODS IN STUDYING SEASONAL MOVEMENTS OF THE SHARP-TAILED GROUSE IN MORTON COUNTY, NORTH DAKOTA. M. S. thesis, Utah State Agr. Coll. 53 p. 1957.

A baited funnel trap effectively caught sharp-tailed grouse for marking. Cannon-net traps injured the birds. Auromine- and rhodomine-dyed birds were recognizable in the wild for over 3 months. No mortality was associated with dyed birds. Dancing grounds and nesting grounds were located within 2 miles of wintering grounds.--Jessop B. Low.

Koskimies, Jukka. FLOCKING BEHAVIOUR IN CAPERCAILLIE, TETRAO UROGALLUS (L.), AND BLACKGAME, LYRURUS TETRIX (L.). Papers on Game Research (Helsinki) no. 18. 1-32 p., 4 figs. 1957.

In English. Good discussion of biology of winter flocking of these grouse. It tells how flocks are formed, what the relations of age and sex are to flocking, how the species differ in these respects, what behavioral changes are associated with flocking, how large the flocks are, what the effect of weather is on flocks, and how flocking varies from south to north. The author also discusses the role of sociability in animals generally, and its interaction with hormonal drives, especially in birds.

Larsen, James A., and James F. Lahey. (U. Wis.) INFLUENCE OF WEATHER UPON A RUFFED GROUSE POPULATION. J. Wildl. Mgt. 22(1): 63-70, 2 graphs. Jan. 1958.

A statistical technique developed by Fisher (1924) utilizing orthogonal polynomials, has been employed to demonstrate that about 50% of the variability of the ruffed grouse population of the Cloquet Exp. Forest in Minn. during the years 1927-55 is associated with corresponding annual changes in the distributional pattern of maximum temperature. The curve depicting effect of a degree above av. of maximum temperature throughout the year shows that warm days in spring and summer tend to be associated with a high grouse population the following April, and that warm days during winter tend to be associated with a low grouse population the following April. Possible ecological relationships responsible for this association are discussed.--Authors.

Leach, Howard R., and Bruce M. Browning. (Calif. Dept. Game.) A NOTE ON THE FOOD OF SAGE GROUSE IN THE MADELINE PLAINS AREA OF CALIFORNIA. Calif. Fish & Game 44(1): 73-76, 1 photo. Jan. 1958.

Report on analysis of 85 stomachs taken in Sept. from waterfowl management area where agricultural weeds were common. Chief foods, by volume, were flowers of prickly lettuce (50%), leaves and flowers of sagebrush (32%), leaves of alfalfa (9%), and leaves of rabbitbrush (3%). Small numbers of ants were eaten by many individuals.

Nilsson, Nils N. (Nev. Game Comm.) NEVADA'S EXPERIENCE WITH EXOTIC GAME BIRDS. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 283-285. 1957.

Chukars boomed then dropped off during drought, so sportsmen demanded new and better exotics. The state looked into the subject and ordered 100 pairs of seesee partridges (Ammoperdix) from dealer in India. On arrival, the birds proved to be francolins and many were diseased and parasitized. Survivors are being propagated. Seesees were reordered. Author concludes: 1. More exotics can fit specific parts of U. S. 2. Every possible effort should be made to manage game birds already present. 3. Introductions of exotics must proceed slowly. 4. Introduction of disease is a very real threat; precautionary methods of Dept. Agr. are not only justified but should be strengthened. 5. Sportsmen must be given enough facts to reduce their Utopian demands for exotics.

Nyberg, Arvo, and Timo Niemi. INVESTIGATIONS ON THE OCCURRENCE OF TETRAONIDS IN DIFFERENT FOREST TYPES IN THE COMMUNES OF KAUHAVA, TÖYSÄ AND KEMIJÄRVI. Suomen Riista 11: 65-73. 1957.

In Finnish with long English summary on separate mimeo. sheet. Analysis of habitat types preferred by capercaillie, blackgame, willow ptarmigan, and hazel grouse. Habitat factors that influence these species are discussed. The species differed in their preferences, but in general transitional types such as swampy heaths and swampy forests were favored. This may represent edge effect, i.e., the birds preferred transitional zones of different groups of types. As to tree species, a mixed stand was most popular with all kinds of grouse considered. However, dominance of pine favored capercaillie and willow ptarmigan while dominance of spruce favored blackgame and hazel grouse.

Paludan, Knud. (Danish Game Res. Sta., Kalø.) PARTRIDGES RINGED DURING 1950-54. Danske Vildtundersøgelser, Hefte 7. 1-27 p., 1 graph. 1957.

In Danish with English summary and legends. In the 5 years, 8,225 marked Perdix perdix (apparently pen reared) were released in various ways. Recoveries totaled 230. Few released birds dispersed more than 2 km. Aside from recoveries in year of release, mean annual mortality was about 83.9%. If mortality is assumed to be identical in all age groups except the first, the observed frequency

distribution of recoveries does not differ significantly from that expected. Birds that survived until their first April 1 had a mean life expectancy of about 0.693. Those that survived to the next April 1 had expectancy of 0.753. Survival to breeding season was 5 times greater in adults and subadults released in Nov. than in those (mostly chicks) released in summer. Chicks released with adult partridges seemed to survive no better than those released with domestic hens. Estimates suggest that of 40 chicks released in summer, only 2 would survive through first breeding season to the subsequent shooting season. High chick mortality and short life of adults must be considered in judging importance of releases.

Parviainen, A. ON METHODS OF PREVENTING FOREST BIRDS FROM NESTING IN LOGGING OPENINGS WHICH ARE TO BE BURNED OVER. Suomen Riista 11: 134-140, 1 photo. 1957.
In Finnish with English summary on separate mimeo. sheet. Imitation hawks and strips of glazed paper were placed in the openings even before snow melted. Results were not satisfactory. Birds nested near the frightening devices. 48% of tetraonid nests were less than 10 m. from edges of clearings.

Rauhala, Toivo, and Pekka Reinikka. PROTECTION OF THE NESTS OF TETRAONIDS IN BURNED-OVER AREAS. Suomen Riista 11: 89-100, 7 figs. 1957.
In Finnish with English summary on separate mimeo. sheet. In areas to be burned, an area of about 1-1.5 m. around each nest is protected by fire break and is well wetted. Nest is covered with sticks, moss, and peat, which are removed after burning. Eggs hatch from 50% of nests so treated. Some fail because area was not wetted enough, some are abandoned. Capercaillie and blackgame prefer to nest in small clearings (under 10 hectares) that have been logged in previous year at the earliest. 43% of nests are less than 10 m. from edge of opening and 35% are 10-50 m.

Schneider, Francis. (Ore. Game Comm.) AN INTRODUCTION OF EUROPEAN GRAY PARTRIDGE OF DANISH STOCK INTO THE WILLAMETTE VALLEY, OREGON. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 271-273. 1957.
How birds were propagated and released. Results are still uncertain.

Seiskari, Pertti. EXPERIMENT WITH MELTING SNOW TO STUDY THE NESTING SITE REQUIREMENTS OF TETRAONIDS. Suomen Riista 11: 157. 1957.
In Finnish with English summary on separate mimeo. sheet. Forest grouse like to nest in openings that become snow-free early in spring. Snow of 44 sites was melted with lampblack. Three nests were found in treated areas, 3 near them. Five times grouse were seen feeding in treated areas; also 1 moose with calf, and 1 hare. "It seems that artificial snowless spots attract game but have not proved a sure means of inducing forest birds to nest at certain sites."

Seiskari, Pertti. ON THE WINTER FEEDING OF THE WILLOW PTARMIGAN. Suomen Riista 11: 43-47, 2 photos. 1957.
In Finnish with English summary on separate mimeo sheet. Favorite feeding habitats were peat bog, the driest form of swamp land, and, toward spring, fields and meadows. Favorite winter foods were birch and willow. Dwarf birch and undershrubs were very important in early winter. After these were covered with snow, willows were most important. Depth of snow determined winter diet, for undershrubs were used as long as they could be obtained from under snow.

Siivonen, Lauri. (Game Res. Inst., Unioninkatu 45B, Helsinki.) THE PROBLEM OF THE SHORT-TERM FLUCTUATIONS IN NUMBERS OF TETRAONIDS IN EUROPE. Papers on Game Research (Helsinki) no. 19: 1-44 p., 11 figs. 1957.
In English. Important, well-documented study of causes of grouse cycles, especially in Finland. The most basic factor is winter food conditions, which determine condition of ♀♀ in spring. But the immediate cause of fluctuations is availability of green food in early spring (pre-laying period), for this can restore or worsen condition of hens and thereby govern numbers and quality of eggs. Availability of early spring greens depends on temperature in a short period before laying. Severely low temperatures at this time can result in low autumn populations. Fluctuations thus arising are steeper and shorter in the North, where winter conditions are harshest and need of spring greens is greatest. Farther south, fluctuations are longer and less sharp, and other factors have more chance to affect populations. Individual variation in breeding dates is a

mechanism by which some breeding success is obtained even in the worst years. Large-scale weather changes tend to cause synchronism or parallelism of fluctuations in different areas and different species, as in small rodents, and perhaps in seed crops. Experiments with captive gallinaceous birds supported the hypothesis presented in this paper; reproductive phenomena typical of increase and decrease years were produced. How can this hypothesis be put to work? "This can be done by artificially clearing snow, especially in early springs of decrease years, from areas (snowless spots) with natural or sown, frost-resistant early green plants, i.e. by speeding up and furthering artificially the appearing of early green plants in the display and nesting areas..." Autumn grouse populations can be forecast as soon as conditions in the pre-laying period are known.

Suomus, Heikki. REVIVAL OF THE WILLOW PTARMIGAN POPULATIONS MAY BE REALIZED WITHIN A FEW YEARS. Suomen Riista 11: 42. 1957.

In Finnish with English summary on separate mimeo. sheet. Success in speeding increase of populations in S. Finland is expected from allowing hens to nest in pens placed in release areas. Hens and their broods are released from the pens in August. [The principle seems to be identical to that discussed at length by Chapman, J. Wildl. Mgt. 20(3): 293-297.]

Symington, D. F., and T. A. Harper. (Sask. Dept. Nat. Resources, Regina.) SHARP-TAILED GROUSE IN SASKATCHEWAN. Sask. Dept. Nat. Resources, Cons. Bul. no. 4. 1-24 p., 13 figs. [1957.]

An interesting narrative account of natural history and management under the headings: range and distribution; appearance, habits, and life history; enemies; habitat; and management. Discussion and analysis of status and distribution occupies the greater part of the bulletin. Six major habitat types are described. Of these, the sand hills is the best. Here late summer populations are 25-40 birds per sq. mi. of favorable habitat, of which there may be 1000 sq. mi. in 4000 sq. mi. Parklands are less favorable owing to farming and grazing, and conditions are becoming worse. It is concluded that hunting and predation are not limiting and may be beneficial. Habitat improvement is the only satisfactory management measure. Recommendations include: fencing certain areas from grazing, developing brush-grown fence rows, broadcast seeding of sweet clover, prevention of stubble burning, allowing marginal land to go back to pasture and brush, and development of managed farm woodlots. Research is recommended on management by planting and controlled burning.--L. F. Stickel.

Webb, Paul M. (Ariz. Game Dept.) THE INTRODUCTION OF THE GREY FRANCOLIN IN ARIZONA; A PROGRESS REPORT. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 274-276. 1957.

Summarizes knowledge of biology of Francolinus pondicerianus, and describes releases and release sites. Competition with native game birds is a distinct possibility. Some reproduction was observed after releases, but the introduction is believed to have failed.

## TURKEY

Crispens, Charles G., Jr. (Ohio State U., Columbus.) USE OF PROLACTIN TO INDUCE BROODINESS IN TWO WILD TURKEYS. J. Wildl. Mgt. 21(4): 462. Oct. 1957.

Two adult ♀ wild turkeys brooded chicks for a period of 4 weeks following 6 daily injections of 18 mg. of prolactin.--Author.

Frye, O. E., Jr. (Fla. Game Comm.) A POSSIBLE OCCURRENCE OF AVIAN LEUKOSIS IN THE WILD TURKEY. J. Wildl. Mgt. 22(1): 94, 1 photo. Jan. 1958.

Examination of a complete wild turkey skeleton found in Fla. and showing abnormal calcium deposits indicates an apparent case of the osteopetrotic form of avian leukosis. Metatarsi were not involved and there was no encroachment upon the cortex. This disease of diffuse periosteal proliferation and ossification apparently was the cause of death.--E. B. Chamberlain, Jr.

Plis, Stanley, and George Hartman. (Wis. Cons. Dept.) ARE THE TURKEYS TAKING? Wis. Cons. Bul. 23(2): 11-14, 3 photos. Feb. 1958.

Wis. has stocked over 740 semiwild turkeys in n. Juneau Co., 1954-57. The birds have wintered well, with feeders and food patches supplementing natural foods. Broods have been seen each year since 1954, and 18 broods were seen in 1957. The turkeys have become wilder and known losses have not been high. Turkeys are scattered over an area of a quarter million acres in several counties. Local sentiment favors their protection. It is still an open question, however, as to whether the flock will be able to provide even limited hunting in the future.

Reynolds, Temp. (Utah Dept. Game.) TURKEY TALK. Utah Fish & Game Mag. 13 (11): 5. Nov. 1957.

16 turkeys of the merriami race were planted in the LaSal Mountains near Moab, Utah, in 1952. Turkeys are now well established there, and introductions into other parts of s. Utah are under way. Most of this short article is a review of turkey life history, with mention of habitat requirements in Utah.

Rose, B. J. (Mont. Game Comm.) A TURKEY SEASON IN MONTANA? Mont. Wildl., Jan. 1958, p. 5-8, 3 figs.

Wild Merriam's turkeys have been established successfully in several areas of e. Mont. where stands of Ponderosa pine are interspersed with open grassy parks. Increase in at least one area has been explosive; birds have been trapped for transplanting, and limited hunting may be permitted in this area in 1958. This paper summarizes what has been learned in Mont. about weights, seasonal movements, roosting habits, breeding, and foods. Turkeys summer in forested high country but come down to eat grain in stubble fields in fall and winter. Daily range is about 2-3 miles, less during deep snow. Peak of mating is in April. Av. clutch is 10 eggs. Hatching is mainly in early June. One brood per year is raised. Chief summer foods are grasshoppers and other insects, with various fruits and seeds secondary. Winter food is grain, hawthorne fruits, snowberries, and grass heads. Coyotes are scarce owing to control, and predation on turkeys has been minimal. Poaching may have limited l population. Rate of increase in 2 areas is discussed.

Schorger, A. W. (U. Wis., Madison.) THE BEARD OF THE WILD TURKEY. Auk 74 (4): 441-446, 2 pl. Oct. 1957 [Jan. 1958].

Nature of bristles in beard, shape of bristles in cross section, continuous growth of bristles, occurrence of beards in ??, and morphological classification of the bristles.

Spicer, Robert L. (N. M. Dept. Game.) EMIGRATION IN MERRIAM'S TURKEY. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 230-233. 1957.

Summary: "About 1,000 of the estimated 1,500 turkeys...on Mount Taylor [n. N. M.] emigrated in the late fall of 1955. Male-female ratios observed in the spring of 1954, 1955, and 1956 were 70-100, 74-100 and 170-100, respectively. The mean flock size in the spring of 1955 preceding the emigration was significantly higher than the means of 1954 and 1956. The possibility that this was not an isolated event was discussed. Factors which might have influenced the emigration were recorded and discussed briefly. A few observations of similar phenomena in other species were mentioned."

## DOVES AND PIGEONS

Aldrich, John W., Allen J. Duvall, and Aelred D. Geis. (US F&WS, Wash., D. C.) RACIAL DETERMINATION OF ORIGIN OF MOURNING DOVES IN HUNTERS' BAGS. J. Wildl. Mgt. 22(1): 71-75, 1 map. Jan. 1958.

The source of mourning doves was determined in hunters' bags in Texas and Ga. from racial identification of wing samples. Georgia samples were mostly eastern race, carolinensis, in early fall, and mostly western race, marginella, or intermediate, in winter. S. Texas samples showed an earlier migration and were mostly from out-of-state populations in all seasons.--Authors.

Carter, Dennis Lee. PRODUCTION OF THE MOURNING DOVE AT LEWIS, IOWA, 1956. M. S. thesis, Iowa State Coll. 1957. [From Iowa State Coll. J. Sci. 32(2).]

Howarth, Robert C. A STUDY OF THE MOURNING DOVE IN CENTRE COUNTY, PENNSYLVANIA. M. S. thesis, Pa. State U. 1954.--P. F. English.

Korschgen, Leroy J. (Mo. Cons. Comm.) FOOD HABITS OF THE MOURNING DOVE IN MISSOURI. J. Wildl. Mgt. 22(1): 9-16. Jan. 1958.

At least 218 plant and 39 animal foods were identified in crop contents of 2,000 doves collected in 55 Mo. counties in the months Apr.-Oct., mostly 1951-53. The 10 most important foods, which comprised 90.5% of volume, included grasses, spurges (Euphorbiaceae), legumes, and composites. Av. percentages for principal May-Sept. foods were: corn, 35.0; wheat, 34.0; yellow foxtail, 11.7; giant foxtail, 2.4; small wild bean, 1.8; sand croton, 1.4; common ragweed, 1.4; hogwort, 1.3; cane, 0.8; and painted-leaf spurge, 0.7, by volume. Seeds made up 99.2% of the av. diet. More than 2/3 of food was from agricultural crops. Animal foods, principally snails, comprised 0.4 per cent, and gravel the remaining 0.4 per cent. Major changes in feeding habits were noted from month to month and year to year. There were no indications of food shortage and no complaints of crop damage.--Author.

Macgregor, Wallace G. (Calif. Dept. Game, Fresno.) NON-UNISEXUAL BROODS IN THE MOURNING DOVE. J. Wildl. Mgt. 22(1): 103. Jan. 1958.

Squabs from 11 broods were checked for sex by internal examination. Contrary to certain published reports, the broods were not regularly unisexual. Six broods contained 1 ♂ and 1 ♀, three contained 2 ♂♂ each, and two contained 2 ♀♀ each. This approximates the 1:2:1 ratio found in pigeons.--Author.

Macgregor, Wallace G. (Calif. Dept. Game.) A TECHNIQUE FOR OBTAINING FOOD HABITS MATERIAL FROM NESTLING DOVES. Calif. Fish & Game 44(1): 77-78. Jan. 1958.

Useful on nestlings 6 days old or older. Operator takes water into mouth and blows a little of it through plastic straw into crop of dove. He then manipulates a portion of crop contents out onto small square of cloth and ties cloth into form of small bag for storage. Precautions: air should not be blown into crop and no effort should be made to flush out entire contents of crop.

Newsom, John D., Dan M. Russell, Frank A. Winston, Leonard E. Foote, and Harold S. Peters. (Sr. author: La. Wild Life & Fisheries Comm., New Orleans.) A SUMMARY OF MOURNING DOVE INVESTIGATIONS--1948-1956. Trans. 22nd N. Am. Wildl. Conf. p. 360-379. 1957.

A detailed summary of major activities and results from the Cooperative Dove Study. See also Mourning Dove Investigations 1948-1956, reviewed in this issue of WR.

Peters, Harold S. A FOURTH SET OF ABSTRACTS OF MOURNING DOVE LITERATURE. US F&WS, Peachtree 7th Bldg., Atlanta 23, Ga. 27 p., proc. Dec. 1957.

"Abstracts of 139 articles, theses, and papers... Most of these have appeared since the Third Set of 79 abstracts was compiled in July 1953." Some of the works listed are unpublished or obscure papers that might escape attention except for this compilation. Most papers included are substantial ones, but a few are entirely popular.

Peters, Harold S. RECENT RECOVERIES FROM MOURNING DOVE BANDING. US F&WS, Peachtree-7th Bldg., Atlanta 23, Ga. 4 p., proc. Jan. 1958.

Peters, retiring from government service, here summarizes all banding recoveries in 3 tables. Table 1 gives the states of banding and recovery for the 3,199 most recent recoveries. Table 2 shows states of banding and recovery for 1,071 doves banded as nestlings. Only 59% of these doves were recovered in the state where banded. Table 3 shows states of banding and recovery of 5,448 doves recovered between 1920 and Dec. 1, 1955. Overall recovery rate has been only 3.6%.

Sheldon, Howard L. POPULATION AND PRODUCTIVITY OF THE MOURNING DOVE IN CENTRAL PENNSYLVANIA. M. S. thesis, Pa. State U. 1957.--P. F. English.

[Webb, James W., editor.] MOURNING DOVE INVESTIGATIONS 1948-1956. SE. Assn. Game & Fish Comms., Tech. Bul. no. 1. ix + 166 p., 23 figs. Nov. 1957. Available from J. W. Webb, Box 360, Columbia, S. C.

Definitive report of the SE. cooperative dove study. Results of this successful program are presented in 4 principal sections: census and population, production, mortality, migration and movements. Each has its own summary. Sections on regulations, recommendations for future work (both operational and research), and general summary follow. Factual data are further summarized in an extensive series of tables, maps, and graphs. Statistical validity of data is considered throughout. Excerpts from the summary: Call counts are the most satisfactory annual indices to breeding populations. Random road counts provide information on production, movements, and fall and winter concentrations. Area counts should be made in conjunction with call counts to determine the population a calling dove represents in different parts of the range. Study areas of 200-250 acres are needed in call-count areas to obtain production data necessary for management. Trapping stations and hunter-bag checks both can provide data concerning production. Breeding populations in the SE. ranged from 2.5-13.6 pairs per 100 acres, with production of 12-68 young. The high dove population of 1948-49 suffered a drastic decline from disease in 1950 and severe winter weather in Jan. 1951. The population increased gradually, and reached a high level again in 1955-56. First year mortality was about 70% and thereafter was about 55%. The av. pair must produce 4.6 young to maintain the population when there is this amount of mortality. Data suggest a more rapid rate of turnover in the SE. than in other areas. However, there is no indication of adverse effects of hunting on population level. Liberalization of regulations is recommended. An intensified program to appraise mortality is cited as the most important single research need.--L. F. Stickel.

## WATERFOWL

Addy, C. E., compiler. GUIDE TO WATERFOWL BANDING. US F&WS, Laurel, Md. 164 unnumbered p., 69 figs., proc., looseleaf, punched. Sept. 1956. Single copies available to qualified investigators on request to Banding Office, Patuxent Refuge, Laurel, Md.

Represents the experience and ideas of many waterfowl banders of U. S. and Canada. "The guide consists of four major parts: first, a section on permits, the keeping of records, the processing of records, bands and banding equipment; second, a section on the many traps and trapping techniques; third, a section on special techniques, such as sexing and aging; and fourth, a list of contributors. The pages have been perforated for use in a loose-leaf binder. It is anticipated that from time to time material will have to be added or corrections made." [This encyclopedic manual is another example of the fact that some of the best material in the wildlife field is not formally published and therefore cannot be located through bibliographic channels or found in libraries.]

Airey, A. F. WHOOPER SWANS IN SOUTHERN LAKELAND. Bird Study 2: 143-150. 1955. [From notice by M. T. M., Auk 74(4).]

"Winter studies of Cygnus cygnus in north-west England. Routes and flight lines, territory, greeting and sex display, molting, head and neck plumage staining, upending for food, and preening are discussed. The distribution and composition of flocks, and local weather movements are described."

Anon. THE RESTORATION OF BREEDING CANADA GOOSE POPULATIONS ON NATIONAL WILDLIFE REFUGES. US F&WS, Branch Wildl. Ref., Wildl. Mgt. Ser., Leafl. no. 15. ii + 21 p., 2 figs. Feb. 4, 1958.

The most detailed and comprehensive account of how to handle Canada geese to build up new breeding or wintering populations. It takes up: reasons for past successes and failures, prerequisites for undertaking goose restoration on a refuge, planning and construction of enclosures, age of birds to start with and how to get them, care and handling of birds, management of flock in accord with goose behavior, feeding, predator control, and how to make and apply brails. The program should begin with young of the year; adult ?? seldom will breed anywhere other than their accustomed breeding sites.

Ballou, Robert M. (Wyo. Game Comm.) A BRIEF REVIEW OF WYOMING'S GOOSE RESTORATION PROGRAM. Proc. 37th Ann. Conf. W. Assn. State Game & Fish Comms. p. 251-255. 1957.

Wyo. has tried Canada goose restoration with both young and adults and has gained much knowledge of what does and does not work. So far, restoration has succeeded on only 1 area, but work is continuing. The paper gives much information on how birds are obtained, what features are necessary in a restoration area, types of places geese choose to nest, movements of broods from nesting to rearing waters, and plans for future work. A captive flock is maintained for production of goslings to be released elsewhere. Goslings are released in fair numbers in areas improved for them. Geese produced in captivity are more tolerant of man than are truly wild birds. If not actively disturbed, they will nest in or near places of human activity. A large, secluded brooding area seems to be a vital part of the breeding environment. Geese will settle for relatively small nesting areas if undisturbed, even if these areas are some distance from brooding grounds. Restoration geese will disperse and use good breeding areas adjacent to restoration unit. Multiple use can be made of areas managed primarily for goose breeding. Unfavorable factors are: large fluctuations of water level, areas too small for brooding, too few nest sites, too little protection from hunting, too much disturbance, releases of too few birds.

Barry, Thomas W., and Jay N. Eisenhart. (Can. Wildl. Serv., Edmonton, Alberta.) ROSS' GEESE NESTING AT SOUTHAMPTON ISLAND, N.W.T., CANADA. Auk 75(1): 89-90. Jan. 1958.

Benson, Dirck, Donald D. Foley, and Donald L. Schierbaum. (N. Y. Cons. Dept.) THE PROBLEM OF SETTING DUCK HUNTING SEASONS IN NEW YORK. N. Y. Fish & Game J. 4(2): 194-202, 7 figs. July 1957 [Jan. 1958].

Abstract: "During the years 1948 through 1953 periodic aerial survey flights from September through January were flown over the six main waterfowl regions of the State. Data from these surveys have been graphed to show the periods of abundance of dabbling ducks and diving ducks in the several regions. These data together with limited hunter bag check records, band returns, and weather information are discussed to illustrate the problems involved in setting equitable waterfowl seasons under the necessary basic framework established by the U. S. Fish and Wildlife Service. It is concluded that the present season dates for Long Island are almost ideal, and that the upstate season is reasonably equitable. However, an early opening date for the Lake Champlain region is suggested, and there are strong differences of opinion regarding the importance of late-season gunning for diving ducks."

Bossenmaier, Eugene F., and Wm. H. Marshall. (Dept. Mines & Nat. Resources, Winnipeg 1, Man.) FIELD-FEEDING BY WATERFOWL IN SOUTHWESTERN MANITOBA. Wildl. Monog. no. 1. 32 p., 4 figs. Mar. 1958. Price not stated.

The Whitewater Lake region has long had trouble with ducks and geese damaging grain crops. The problem apparently increased in the 1920s when more vulnerable types of grain were first planted, and again in the 1940s when the windrow-combine method of harvest became common. Damage varies with the agricultural cycle, weather, availability of grain, behavior of birds, and perhaps with availability of aquatic foods. All of these are discussed, as is extent of damage. As to control, authors conclude: "The present control program for the Whitewater Lake district has inherent weaknesses that are working against the interest of both farmers and waterfowl conservationists. A new program is suggested that, if adopted, will immediately establish a non-farmer financed patrol in the district to coordinate and improve the damage control activities of landowners. Forced emigration, supplementary feeding in the form of lure crops, and compensation for damages are possible measures for extremely unfavorable years when usual control methods are inadequate. The initiation of a long-range program for the development of feasible cultural methods of control is recommended."

Boyd, Hugh. (Wildfowl Trust, Slimbridge, Gloucestershire, Eng.) MORTALITY AND FERTILITY OF THE WHITE-FRONTED GOOSE. Bird Study 4(2): 80-93. 1957. [From long review by O. L. Austin, Jr., Bird-Banding 28(4).]

"This well-planned study of the demography of the Anser a. albifrons population that breeds in arctic Russia and winters in Britain and Wales makes ingenious use of a type of data seldom if ever before used for the purpose. It

is based primarily on the analysis of extensive, careful observations on the number, size, and composition of the family groups of White-fronts wintering on the B.T.O.'s Slimbridge preserve for five successive seasons. Analyses of the 62 recoveries received up to 1956 from the 232 White-fronts banded there from 1948 through 1953 supplement the conclusions drawn from the observational statistics. In the adult geese the annual mortality is about 30 percent, some seven-tenths of which occurs during spring migration and on the breeding grounds. Adult losses on the wintering grounds are on the order of 1.8 percent per month. Lack of breeding ground data prevented Boyd's assessing the White-front's productivity accurately, but he estimates that at least one-third of each year's crop of young is lost between the time of hatching and arrival on the wintering grounds. As the wintering-ground losses of first-year birds are about 3 percent per month, the species' first-year mortality must be well in excess of 50 percent. From the available evidence Boyd concludes the population 'may be fairly described as stationary,' and is able to hold its own largely because its fecundity 'is apparently adapted to an environment in which in most years large scale breeding failures occur.'" Austin comments on birds that are adjusted to low breeding success. All these birds tend to mature late, breed only in 2d or later year of life, have low adult mortalities, and live long. Most are more or less colonial breeders, and most are highly migratory. In all, maintenance of adult population seems more important than success of any 1 crop of young. The relationship deserves more attention.

Cartwright, Bertram W. WATERFOWL BANDING 1939-1954 BY DUCKS UNLIMITED. 2nd ed., revised. Ducks Unlimited, Winnipeg 2, Man. 35 p., 2 maps. 1956. No price stated. [From review by O. L. Austin, Jr., Bird-Banding 28(4).]

Adds 4 more years to totals published in 1952. Tabulations of banding and recoveries are given for species, states, and flyways. A list of totals of recoveries outside the U. S. reveals that 30% of D.U.'s ducks are killed in Canada. The last 3 tables list return totals by localities. "My calculations for the few sets of data I could correlate show the return percentages to be astonishingly, even alarmingly low. They are certainly less than 1 percent of the probable number trapped, and a small fraction of 1 percent of the numbers of banded birds theoretically available to return. This is far lower than any other breeding ground return percentages I have ever seen, and does not augur well for the stability of the waterfowl breeding population nor D.U.'s conservation efforts. If D.U.'s return figures are correct, the ducks on their nesting preserves are either flouting all the laws of population dynamics, or else are maintaining their numbers (if they are doing so) against heavy odds."

Cotter, Wm. B., Jr. (Coll. of Charleston, S. C.) A SEROLOGICAL ANALYSIS OF SOME ANATID CLASSIFICATIONS. Wilson Bul. 69(4): 291-300. Dec. 1957.

Gives much information on refined serological techniques employed, and concludes: "Analysis...has validated the conclusions of Delacour and Mayr, in their uniting the genera Cairina and Aix in the single tribe Cairinini."

Crissey, Walter F. (US F&WS, Wash., D. C.) FORECASTING WATERFOWL HARVEST BY FLYWAYS. Trans. 22nd N. Am. Wildl. Conf. p. 256-267, 2 figs. 1957.

It is important that forecasts of harvestable surplus of ducks be made with reasonable accuracy, since at present the gun is by far the largest mortality factor for several important species, once they reach the flying stage. Methods now used by the US F&WS for forecasting changes each fall in the 4 waterfowl flyways are presented in this paper. Items discussed include: (1) breeding ground survey methods; (2) calculation of a continental breeding population index; (3) estimation of current production in terms of departure from av. of previous years; (4) estimation of av. production by means of a determination of av. mortality from banding data; (5) estimation of current production indices by means of modified production ratios applied against av. breeding population indices; (6) estimation of fall flight from each survey area by combining breeding population and production indices; and (7) use of breeding ground banding data as a means of dividing the fall flight indices from each breeding area into the portion likely to be harvested in each of the flyways. The accuracy of past forecasts is discussed. Although it appears that minor errors have been made, forecasts have been sufficiently accurate for the purpose of supplying information upon which to set the annual shooting regulations.--Author.

Cronan, John M. (R. I. Div. Game, Providence 3.) EFFECTS OF PREDATOR GUARDS ON WOOD DUCK BOX USAGE. J. Wildl. Mgt. 21(4): 468. Oct. 1957.

Usage of wood duck boxes with and without predator guards (of wooden tunnel type) was evaluated on a number of selected areas in n. R. I. When wood ducks have the opportunity to choose a box with or without a predator guard, they prefer boxes without guards. If all of the boxes on an area have guards, however, it appears that the desire to nest on a particular site is greater than any dislike for predator guards.--Author.

Cronan, John M., Jr. (Rhode Is. Div. Fish & Game, Providence.) FOOD AND FEEDING HABITS OF THE SCAUPS IN CONNECTICUT WATERS. Auk 74(4): 459-468. Oct. 1957 [Jan. 1958].

Summary: "Animal food comprised 93.4 per cent of the contents of the Greater Scaup stomachs examined and the most important animal foods were mollusks. Sea lettuce was the only important plant food of the Greater Scaup. The Lesser Scaup stomachs examined indicated that animal food makes up 61.7 per cent of their diet, and as in the Greater Scaup the most important animal foods were mollusks and the most important plant food sea lettuce. Scaup feeding areas were sampled and most of the areas had quantities of the same food items that were found in the scaup stomachs. None of the non-feeding areas examined had scaup food items present in any quantity. Mollusks were unquestionably the favorite scaup food, but the particular molluscan species taken appeared to depend upon availability. Scaup feeding did not appear to be affected by any factor except human activity."

Douville, Clayton H., and Charles E. Friley, Jr. (Mich. Dept. Cons., Allegan.) RECORDS OF LONGEVITY IN CANADA GEESE. Auk 74(4): 510. Oct. 1957 [Jan. 1958].

Wild birds banded at Kingsville, Ont. and shot near Allegan, Mich. had lived at least 12, 12, 13, 15, 18, and 23 years. Weights are stated for most of these individuals.

Gates, John M. (539 W. Main, Madison, Wis.) AUTUMN FOOD HABITS OF THE GADWALL IN NORTHERN UTAH. Proc. Utah Acad. Sci., Arts & Lett. 34: 69-71. 1957.

Contents of 199 stomachs collected 1947-50 and 1955 were analyzed. Principle foods were vegetative parts of Potamogeton pectinatus, Ruppia maritima, Zannichellia palustris and seeds of Scirpus acutus and Distichlis stricta. Animal foods constituted only 2.5% of food volume. Ingested lead shot were found in 3% of stomachs.--Author.

Grieb, Jack R. (Colo. Dept. Game.) DO CLOSED RESERVOIRS MAKE BETTER HUNTING? Colo. Outdoors 6(6): 21-23, 1 photo. Nov.-Dec. 1957.

Further evidence from Colo. that closing reservoirs to shooting makes better waterfowl hunting in vicinity. Not all of a large reservoir need be closed, however. For earlier article on this topic, see Colo. Outdoors 5(6): 18-20, reviewed in WR 88: 76.

Hansen, Henry A., and Urban C. Nelson. (US F&WS, Juneau, Alaska.) BRANT OF THE BERING SEA - MIGRATION AND MORTALITY. Trans. 22nd N. Am. Wildl. Conf. p. 237-254, 2 figs. 1957.

Authors' summary: "Black brant studies in Alaska and along the Pacific coast since 1949 are the basis for this report. Nesting studies reveal facts on egg laying, hatching, nesting losses and brood mortality. Band returns reveal migration from the Yukon Delta to the Alaska Peninsula, thence, across the ocean to the Pacific coast states. Band returns express mortality and confirm winter inventory reports that approximately 85 percent of the brant population winters in California and Mexico. Evidence of differential migration by age groups is reported. Brant numbers have shown an average decline of 6.7 percent annually since 1949 and evidence suggests excessive hunting mortality as the cause. Needs for management include knowledge of (1) breeding age, (2) aging technique, (3) crippling loss, (4) post-banding losses, (5) band returns of an aberrant nature, (6) Asiatic migrations, (7) wintering populations not yet inventoried and (8) hunter harvest."

Hanson, Harold C. (Ill. Nat. Hist. Surv., Urbana.) OUR WILD GEESE--AN INTERNATIONAL HERITAGE. Ill. Wildl. 12(4). 2 unnumbered p., 1 photo. Sept. 1957.

From his own experiences in the North, Hanson tells what the goose resource means to the Cree Indians, what the muskeg breeding areas of Canada geese are like around Hudson Bay and James Bay, how the adult and young Canadas live and behave, and how different local populations of these birds consistently use particular flyways and winter in traditional areas. Most Canada geese winter on refuges where they can be managed and kills can be observed and regulated. Sport shooting is the critical factor, not killing for food by Indians. The population is high and headed upward and the breeding grounds seem safe.

Hanson, Harold C., Norman D. Levine, and Virginia Ivens. (Ill. Nat. Hist. Surv., Urbana.) COCCIDIA (PROTOZOA: EIMERIIDAE) OF NORTH AMERICAN WILD GEESE AND SWANS. Can. J. Zool. 35(6): 715-733, 4 figs. Dec. 1957.

Describes 10 spp. (2 new) from 362 wild geese and swans. Many of the spp. are not host specific. "Reports in the literature on the species of coccidia occurring in wild and domestic geese and their prevalence and geographic distribution are summarized with particular reference to North American flyways."

Hickey, J. J. (U. Wis., Madison.) AUTUMNAL MIGRATION OF DUCKS BANDED IN EASTERN WISCONSIN. Trans. Wis. Acad. Sci. Arts & Letters 45: 59-76. 1956. [From abstract by J. T. E., Auk 74(4).]

"An analysis of 1064 recovery reports of Mallards and a smaller number of ducks of other species banded at two stations in eastern Wisconsin showed a wide dispersal into the Canadian Provinces in spring. Large numbers wintered in Arkansas and Louisiana and a smaller number along the Atlantic Seaboard from Virginia to Florida."

Hunt, Richard A., Laurence R. Jahn, Ralph C. Hopkins, and George H. Amelong. (Wis. Cons. Dept.) AN EVALUATION OF ARTIFICIAL MALLARD PROPAGATION IN WISCONSIN. Wis. Cons. Dept., Tech. Wildl. Bul. no. 16. 1-79 p., 8 photos, 11 maps & graphs. 1958.

10,371 mallards were produced from matings of domestic with wild birds during the period 1949-53. They were hand-reared to 4 weeks of age and released in various types of areas. Cost was $2.04 per bird. 27% were recovered. 94% of these were shot the first year, most of them within 20 miles of release point. Over all, percentage of recoveries of hand-reared birds was about the same as of wild birds. Differences were: more hand-reared birds recovered first year, more recoveries near release points, hand-reared birds too tame and more sedentary. Authors conclude that mallard stocking is essentially for the gun, that 155,000 mallards would have to be released to increase the Wis. duck kill by 10%, that artificial stocking is no answer to the problem of providing more ducks, and that it would be better to improve and extend waterfowl habitat. The paper provides a great deal of data and/or discussion on the following topics: review of literature, production of eggs, fertility, hatchability, rearing losses, weights, time and location of band recoveries, dispersal, comparison of results of releases on refuges and public hunting grounds, fate of released adult breeders, comparisons with wild mallards, poor nesting in wild by hand-reared mallards, production costs, and management implications.

Jessen, Robert L. (Minn. Div. Game.) AERIAL CENSUS OF WATERFOWL BREEDING POPULATIONS AS AN INDEX TO HABITAT UTILIZATION. Minn. Dept. of Cons., Game Invest. Rep. no. 1. 6 p., 1 graph, mimeo. Sept. 1957.

Aerial and ground surveys of breeding populations were made on 13 waterfowl areas to determine relative accuracy of the 2 methods. On each area, ground counts preceeded aerial counts by 1 day. For 10 areas, which had adequate ground surveys, correction factors for converting aerial to ground counts varied from 0.48 to 10.66. The mean was 1.57. The reasons for wide discrepancies were not determined, but it is believed that weather conditions did not account for them. Aerial surveys did not provide reliable indices of breeding populations on individual areas.--Clark G. Webster.

Koskimies, Jukka. (Game Res. Inst., Unionink. 45B, Helsinki, Finland.) POLYMORPHIC VARIABILITY IN CLUTCH SIZE AND LAYING DATE OF THE VELVET SCOTER, MELANITTA FUSCA (L.). Ornis Fennica 34(4): 118-128, 1 graph. 1957.
In English. There were highly significant differences in clutch sizes of different ??. They appeared to represent genetic variation. Individual ?? tended to lay about the same time in different years. Clutch size and laying date were correlated; earliest clutches were largest. Thus ?? that habitually laid early tended to have larger clutches. All clutches, regardless of size, hatched at about the same time. This would be expected if hatching season were adaptively adjusted to most favorable season.

Koskimies, Jukka. (Game Res. Inst., Unionink. 45B, Helsinki, Finland.) VARIATIONS IN SIZE AND SHAPE OF EGGS OF THE VELVET SCOTER, MELANITTA FUSCA (L.). Arch. Soc. 'Vanamo' 12(1): 58-69. 1957.
Statistical analysis of variation in size and shape of eggs and discussion of causal relations and biological significance of these variations. Includes consideration of parentage, laying sequence, clutch size, etc.

Koskimies, Jukka. (Game Res. Inst., Unionink. 45B, Helsinki, Finland.) VERHALTEN UND ÖKOLOGIE DER JUNGEN UND DER JUNGENFÜHRENDEN WEIBCHEN DER SAMTENTE (ZUR FORTPFLANZUNGSBIOLOGIE DER SAMTENTE, MELANITTA F. FUSCA (L.). II). Ann. Zool. Soc. 'Vanamo' 18(9). 11 + 69 p., 12 figs. 1957.
In German with German and Finnish summaries. Long paper on behavior and ecology of young velvet scoters and their mothers. It takes up such topics as: brood habitat, food seeking, daily rhythm of activities, signals of the mother, signals of the young, origin of family bonds, mixed broods, motherless young, reactions to enemies, break-up of broods, females without young, and mortality as related to water temperature and other factors.

Martin, Dale N. (Ind. Div. Game.) WOOD DUCK AUTUMN FLIGHT ACTIVITY IN RELATION TO SUNRISE AND SUNSET. Presented at 19th Mid-West Wildl. Conf. 8 p., 4 figs., mimeo. Dec. 1957.
The author counted wood ducks entering and leaving 2 different roosts in Ind. At Kern's Pond (1957) most ducks had left the roost by 20 minutes before sunrise and returned during the second 15-minute period after sunset. At Willow Slough (1956) about 81% of ducks returned during first half hour after sunset and 18% the half hour before. "...evening counts at roosting areas are superior to counts taken at any other time of day. A count of about one hour duration, from 30 mimutes before sunset to darkness, will include practically every bird using the area."--C. G. Webster.

Neff, Don J. (Ore. State Coll., Corvallis.) VANISHING GEESE. Colo. Outdoors 6(6): 5-8, 4 photos. Nov.-Dec. 1957.
Colo. is in danger of losing its last major flock of breeding Canadas. Geese nesting along the Yampa and Green rivers are in serious, rapid decline, as census figures show. Studies in 1956 revealed good reproductive success on the breeding islands. Trouble appeared to be too much shooting locally and further s. in flyway. Seasons were reduced, but decline continued in 1957. Also, in 1957, reproduction was much affected by floods. Local hunting was stopped. Improvement of breeding islands was begun. Geese nested on ground where visibility was good. Improvements were provision of nesting structures and clearing of vegetation.

O'Meara, D. C. (U. Maine, Orono.) THE ABSENCE OF CLINICAL SIGNS IN LEUCOCYTOZOON INFECTION OF PEN-REARED BLACK AND RING-NECKED DUCKS. Presented at 1958 conf. NE. Sec. Wildl. Soc. et al. 4 p., mimeo. Jan. 1958.
Only 1 duckling showed symptoms despite heavy experimental infections. It seems likely that host-parasite adaptation is good, and that Leucocytozoon infections are not--by themselves--a serious mortality factor in waterfowl of the NE.

Peters, Stuart S. (Cornell U., Ithaca, N. Y.) BROOD CAPTURE INVOLVING CONFLICT BETWEEN TWO FEMALE MALLARDS. Wilson Bul. 69(4): 363-364. Dec. 1957.
Also describes an instance of partial brood capture without apparent conflict.

Preston, F. W. (Box 149, Butler, Pa.) THE LOOK-OUT PERCH AS A FACTOR IN PREDATION BY CROWS. Wilson Bul. 69(4): 368-370. Dec. 1957.

Preston's mallards nest over a wide area, but predators, especially crows, find all of their early nests and most of their later ones. Crows watch movements of ducks and search for their nests. Later nests have some success because ducks can move through heavier cover and sometimes be unseen. Production for a year, however, is only 3-4 young reared from some 200 eggs, or about 2% efficiency. Crows also watch for mallard ducklings and take them when they go on land. Wood ducks, Canada geese, and Egyptian geese are far more effective in protecting their nests and young. Crows use trees, poles, and other tall objects for look-outs. Preston suspects that mallard nesting would be far more successful if all such objects were at least 1/4 mi. from nesting areas, and that this may be the reason mallards and many other ducks are so prone to nest in prairie regions. Author also gives a British game keeper's account of how carrion crows watch for and break up nests of red grouse. This behavior is said to be concentrated in period when young crows are being fed in nest.

Rawls, Charles K., Jr. (Tenn. Game Comm., Tiptonville.) REELFOOT LAKE WATERFOWL RESEARCH. Tenn. Game & Fish Comm., Final Rep. Fed. Aid Proj. W-22-R. 1-80 p., map, graphs, photos. [1958.]

Important bulletin on kill, crippling loss, food habits, problems of the area, and management possibilities. Details are presented in many graphs and tables. Reelfoot, though filling with silt from unwisely used land nearby, is still a tremendous area of swamp and marsh and is a great waterfowl area. Some 20 species use Reelfoot. On 3-year av., 5,916 hunters each spent 7.12 hours to bag 2.02 ducks each day. In addition, at least 1,415 ducks were lost or crippled each day--nearly as many as bagged. Males outnumbered females by 58 : 42. Mallards, ring-necks, gadwalls, and pintails made up 86% of bag. Canada geese increased, thanks to refuge developments. Shovellers, ring-necks, buffleheads, and coots declined steadily in bag. More than 2,300 gizzards of 24 species were examined in food habits study. Results are presented in detail both for kind of bird and kind of plant. An "Apparent Potential Value" of each food is derived from relationship between amount eaten and abundance in area. Of the 23 most important plants, 13 are forest or swamp species, 10 are aquatics, and only 1, corn, is cultivated. Surprisingly, buttonbush was 4th most important, and soybeans were practically ignored by birds. Many important plants would be favored by spring draw-down, but agreement on water-level control seems impossible--interests conflict. Other measures recommended are: cutting and herbiciding of trees and shrubs on certain sites to permit growth of food plants; localized control of aquatic weed stands with herbicides; draw-down and burning to open up areas of giant cutgrass; fall and winter flooding of swamps to encourage waterfowl feeding there. One table shows numbers of lead shot found in gizzards. A black duck gizzard contained 142 shot; 9.56% of all gizzards held some shot.

Requate, Horst. DIE ENTENVOGELZÄHLUNG IN DEUTSCHLAND (1948 BIS APRIL 1953). Biol. Abhandlungen, Heft 10. 1-40 p., 9 figs. 1954. DM 2.50.

In German. Reports, by regions and by species, on numbers of waterfowl in Germany, in period Aug.-April.

Rojas M., Paulino. THE WILD DUCKS OF MEXICO--THEIR IDENTIFICATION, DISTRIBUTION, AND NOTES ON THEIR BIOLOGY. Rev. Soc. Mexicana Hist. Nat. 15(1-4): 95-139, illus. 1954. [From Biol. Abs. 32(2).]

In Spanish. Review of characteristics, key, distributional maps, list of specimens, and brief reviews of natural history of all spp. and subspp. of river, pond and lake ducks (Anatinae).--H. M. Smith.

Rojas M., Paulino. THE WILD DUCKS OF MEXICO. II. Rev. Soc. Mexicana Hist. Nat. 16(1-4): 119-166, illus. 1955. [From Biol. Abs. 32(2).]

In Spanish. The identification with keys, distribution with maps, and notes on the biology of diving ducks, mergansers, masked ducks, and tree ducks.--H. M. Smith.

Rudd, Clayton G., editor. SPECIAL WATERFOWL ISSUE. Naturalist 9(1): 1-64, illus. Spring 1958. $2.00, paper, from Nat. Hist. Soc. Minn., 315 Med. Arts Bldg., Minneapolis 2, Minn.

This large booklet is one of the most attractive and informative accounts of our waterfowl situation ever prepared for conservationists, naturalists, and sportsmen. Emphasis is on midland America, but much of the material applies generally. The volume is exceptionally attractive because of its numerous illustrations, many in color. Sixteen semitechnical articles by experts tell of the condition of our waterfowl resource, analyze negative factors such as drainage and crop depredation, explain how waterfowl populations are studied, describe a few triumphs of management, and show what is being done and should be done in acquisition, management, and research. Articles are: Wood duck dilemma, by F. C. Bellrose. Waterfowl of the prairie, by F. M. Uhler. Waterfowl--A problem of national significance, by I. N. Gabrielson. Canada geese of the Mississippi flyway, by J. D. Smith and F. H. Davis. Migratory bird studies--the Canadian scene by D. A. Munro. National wildlife refuges--a hope for the future, by C. T. Rollings. Waterfowl research--why research is needed, by Clarence Cottam. Spring fashions in Minnesota, by F. B. Lee. Appraising our duck populations, by A. S. Hawkins. Illinois builds a goose flock, by George Arthur. Greenheads and grain in western Canada, by J. B. Gollop. Duck troubles on the prairie, by G. E. Mann. "Fight now or lose at the last (drainage) ditch," by Ernest Swift. Canadian breeding ground, by W. G. Leitch. Duck knowledge, by H. A. Hochbaum. Waterfowl flyways and councils, by L. A. Parker.

Selke, George A. (Minn. Dept. Cons.) NEEDED--MORE THAN WILDLIFE REFUGES. Trans. 22nd N. Am. Wildl. Conf. p. 109-115. 1957.

Recommendations: re-evaluation of flyway management plans; broader viewpoints in flyway councils; refuge modification for regional needs, particularly encouragement of production areas in the northern states; basic research as well as management research; revision of the Coordination Act to allow measures to enhance conditions for fish and wildlife to be incorporated into water projects, and to allow purchase of lands for this purpose; educational and public relations programs for the Fish and Wildlife Service.

Sheldon, Mitchell G. (Colo. Dept. Game.) A NEW NEST FOR HONKERS. Colo. Outdoors 6(6): 26-27, 5 photos. Nov.-Dec. 1957.

Colorado's nesting platforms for Canada geese are supported by steel fence posts and topped with bales of straw. These platforms are expected to help with problems of flooding and nest predation.

Siren, Mika. HOW GOLDENEYE BROODS CAN BE TIED TO ONE'S OWN GAME GROUNDS. Suomen Riista 11: 59-64, 6 figs. 1957.

In Finnish with English summary on separate mimeo. sheet. Based on studies of marked adults and broods. Hen goldeneyes take their young from open water to small pools in the forest. In each of these, the mother places 1-2 young and then moves to other pools, thus abandoning part of her brood at early age. By time young reach flight stage, a mother often has only 1 young left with her. Chances of keeping broods in a given area can be improved by creating small ponds. It is best to have an island of 0.5-1 sq. m. in each pool so young can be safe there from foxes and cats.

Siren, Mika. ON THE FAITHFULNESS OF GOLDENEYE TO ITS NESTING REGION AND NESTING SITE. Suomen Riista 11: 130-133, 2 figs. 1957.

In Finnish with English summary on separate mimeo. sheet. These ducks are very faithful to their nesting regions and sometimes to nesting sites. One hen nested in same box for 5 consecutive years. Often, however, nest site is different each year. Distances goldeneyes were observed to move were 0.3-7.6 km., usually less than 3 km. Once these birds are induced to nest in an area, as by providing boxes, they like to continue nesting there. Different birds will nest in boxes that are very close together.

Webster, Clark G. (Patuxent Refuge, Laurel, Md.) BETTER NEST BOXES FOR WOOD DUCKS. US F&WS, Wildl. Leafl. 393, revised. 1-18 p., 12 figs. Jan. 1958.

Boxes for wood ducks can be a liability if they lead to heavy predation by raccoons and other animals. Small raccoons, common in the South, can enter any hole a wood duck can. The author has experimented with many kinds of boxes and

mountings. Here he tells how to build and erect boxes that will be raccoon proof, and how to build standard boxes for areas where raccoons are large and can be excluded by oval or tunnel entrances. The best and cheapest boxes in the long run are made of sheet metal. They can be mounted on steel posts, or on metal brackets that hold them out from trees. Any type of box can be protected from non-aerial predators by installing wide metal shields below the box.

Weller, Milton W. (Iowa State, Ames.) AN AUTOMATIC NEST-TRAP FOR WATERFOWL. J. Wildl. Mgt. 21(4): 456-458, 1 fig. Oct. 1957.
Welded wire trap has sliding drop door held in place by a pin which is released when ♀ depresses a treadle. Fifty-eight hens were caught. There was no mortality and little egg breakage.--Author.

Yocom, Charles F., Stanley W. Harris, and Henry A. Hansen. (Humboldt State Coll., Arcata, Calif.) STATUS OF GREBES IN EASTERN WASHINGTON. Auk 75(1): 36-47, 6 maps. Jan. 1958.
Western, red-necked, horned, eared, and pied-billed grebes: distribution, seasonal numbers and occurrence, migration, information on breeding and breeding habitats.

## CRANES, RAILS, SHOREBIRDS

Drinnan, R. E. (Fisheries Exp. Sta., Conway, Eng.) THE WINTER FEEDING OF THE OYSTERCATCHER (HAEMATOPUS OSTRALEGUS) ON THE EDIBLE COCKLE (CARDIUM EDULE). J. Anim. Ecol. 26(2): 441-469, 7 figs., 3 pl. Nov. 1957.
Detailed analysis of heavy predation by huge flocks of oystercatchers on commercial beds of cockles (bivalve mollusks). Discusses source and numbers of birds, rhythmic feeding habits of the birds, how the shells are pecked open, how many cockles are eaten, and relation of the predation to cockle population. Oystercatchers are estimated to have taken 21.9% of cockle population in winter of 1954-55. Total annual mortality in the cockle population, however, is 74%. Difficulty of drawing conclusions about economics and predator control in this situation is pointed out: valuable fishes also prey on cockles, cockle populations vary naturally from year to year, and predation by oystercatchers may vary with population density of cockles.

Harris, Stanley W., and Wm. H. Marshall. (Minn. Div. Game, St. Paul.) SOME EFFECTS OF A SEVERE WINDSTORM ON COOT NESTS. J. Wildl. Mgt. 21(4): 471-473, 1 fig. Oct. 1957.
Data on 46 coot (Fulica americana) nests located in marshy cover show that destruction of 11 nests by a 90 m.p.h. wind storm depended on location of these nests with respect to large open water areas. Vegetation, either floating or erect, that broke up wave action appeared to be the critical factor in preventing destruction of 29 nests. Six renestings occurred; clutch sizes were reduced from 8.9 eggs/nest to less than 3.--W. H. Marshall.

Hyde, Dayton O. MY GREATER SANDHILL CRANES. Aud. Mag. 59(6): 264-267, 4 photos. Nov.-Dec. 1957.
Tells how the author breeds and rears these birds on his Ore. ranch in an effort to bolster their dwindling population. The cranes apparently retain their natural instincts and are able to take their place in the wild.

Keller, Charles E. (3905 S. Olney, Indianapolis, Ind.) THE SHOREBIRD FAMILIES: CHARADRIIDAE, SCOLOPACIDAE, RECURVIROSTRIDAE, AND PHALAROPIDAE OF INDIANA. Ind. Aud. Quart. 35: 30-48, 54-60; 36: 2-39. 1957-58.
Shorebirds of Ind. are taken up species by species under the headings: Status, Nesting Data, Migration in Indiana, County Data, and Notes. Information is drawn from personal observations, museum specimens, and the literature. References are cited.

Meanley, Brooke. (Patuxent Refuge, Laurel, Md.) NOTES ON THE COURTSHIP BEHAVIOR OF THE KING RAIL. Auk 74(4): 433-440, 1 fig. Oct. 1957 [Jan. 1958].
Includes data on territories and population density near Stuttgart, Ark.

Miller, Donald R. SOIL TYPES AND EARTHWORM ABUNDANCE IN WOODCOCK HABITAT IN CENTRAL PENNSYLVANIA. M. S. thesis, Pa. State U. 1957.--P. F. English.

Wade, Douglas E. (4238 Pleasant St., Des Moines, Iowa.) TAPE-RECORDING THE AMERICAN WOODCOCK. Chat 21(4): 73-78, 4 photos. Dec. 1957.
Reports findings made during 9 tape-recording sessions on 2 peenting grounds at Columbia, S. C., Feb.-Mar., 1957. Data are given on flights and peenting series as determined from repeated studies of tapes. On 52 peenting series, a total of 2114 peents was given in 6978 seconds (av. 3.3 seconds). 42 upflights av. 47 seconds per flight. Downflights av. 13.4 seconds. Scaling-in and landing av. 7.1 seconds. Av. time from sound of landing to first "peent" or "tookoo" note was 3.3 seconds. Several natural history observations were analyzed by study of the tapes.--Author.

Walkinshaw, Lawrence H. (1703 Wolverine-Federal Tower, Battle Creek, Mich.) INCUBATION PERIOD OF THE SORA RAIL. Auk 74(4): 496. Oct. 1957 [Jan. 1958].
Also Virginia rail.

OTHER BIRDS

Allen, Robert P. (Tavernier, Fla.) FLAMINGO NEWS FROM AROUND THE WORLD. Aud. Mag. 60(1): 10-13, 38-40, 5 figs. Jan.-Feb. 1958.
Brings together the latest personal reports on status, breeding success, and biology of flamingos in many parts of the world.

Berger, Andrew J. (U. Mich. Med. Sch., Ann Arbor.) NESTING BEHAVIOR OF THE HOUSE SPARROW. Jack Pine Warbler 35(3): 86-92. Sept. 1957.

Busnel, René-Guy, Jacques Giban, Philippe Gramet, Hubert Frings, Mable Frings, and Joseph Jumber. (Frings: Pa. State U., U. Park.) INTERSPECIFICITY OF CALLS HAVING MEANING FOR EUROPEAN AND NORTH AMERICAN CROWS. Comptes rendus des séances de l'Academie des Sciences (Paris) 245: 105-108. July 1957.
In French. Recordings of crow calls were made in France, Pa., and Me. Responses were tested in France and U. S., both to the calls of the same species and to calls of foreign species. Crows in France responded positively to all recordings. Crows in Me. responded to calls of their own species, but not to those of French crows. Crows in Pa. responded to distress calls of French crows in summer but not in winter. Authors suggest that the differences may be a result of isolation of the Me. crow population, that the non-responding Pa. crows of winter have migrated there from Me., and that the Pa. summer population goes to Fla. in winter and there learns to respond to a wide variety of calls because of association with crows from other regions.--L. F. Stickel.

Frings, Hubert, Mable Frings, Joseph Jumber, René-Guy Busnel, Jacques Giban, and Philippe Gramet. (Pa. State U., U. Park.) REACTIONS OF AMERICAN AND FRENCH SPECIES OF CORVUS AND LARUS TO RECORDED COMMUNICATION SIGNALS TESTED RECIPROCALLY. Ecology 39(1): 127-131. Jan. 1958.
C. brachyrhynchos of U. S. has assembly calls and alarm calls. French C. monedula, C. frugilegus, and C. corone roost and feed together in winter. Broadcasts of distress calls of French crows cause these birds to first approach and then disperse. "Using exchanged recordings, the distress calls of the French corvines were broadcast to crows of the U. S. There were no observable reactions by the birds in Maine during the summer and Pennsylvania during the winter. In early summer, in Pennsylvania however, the distress call of C. monedula induced crows to approach the sound source. In France, the three species did not respond to the recorded alarm call of the American species, but reacted to the assembly call of the American crow as they did to the distress calls of the French birds. In the U. S., the Herring Gull (L. argentatus) responds to its own food-finding call when recorded and broadcast, by approaching the sound source and to broadcasts of its alarm call by dispersal. In France, with the same species, the calls elicit no response. These observations suggest that these birds develop communication signals within each species having features in common with those of related species, but sometimes with regional variations within the species. In cases in which individuals are exposed only to the signals of their own group, they may become quite specific in reaction. In cases where they mingle with other groups of their own or other species they may learn to respond to the signals of these."

Good, Ernest Eugene. THE LIFE HISTORY OF THE AMERICAN CROW CORVUS BRACHYRHYNCHOS BREHM. Ph.D. thesis, Ohio State U. 203 p. 1952. [From long abstract in Dissertation Abstracts 17(12).]

Although the existence of this thesis was recorded in WR 73: 73, it seems worthwhile to point out that a very long, detailed, and useful summary of this paper appeared on pages 3133-3135 of Dissertation Abstracts for Dec. 1957. Topics discussed include: economic status, longevity, voice, migration, return to nesting area, nesting, clutch size, parental care, roosting habits, food habits, predation on game animals and their nests, diseases and parasites, natural enemies, control methods, value of the crow as an animal to hunt and eat.

Goodge, Wm. Russell. STRUCTURAL AND FUNCTIONAL ADAPTATIONS FOR AQUATIC LIFE IN THE DIPPER (CINCLUS MEXICANUS). Ph.D. thesis, U. Wash. 197 p. 1957. [From long abstract in Dissertation Abstracts 18(1).]

Study of underwater locomotion, appendicular anatomy, and vision. Various adaptations can be discerned, but they are less than might be expected. Structure of eye indicates that dippers probably can see relatively well under water.

Howell, Joseph C. (U. Tenn., Knoxville.) FURTHER HISTORY OF SOME BALD EAGLE NEST SITES IN EAST-CENTRAL FLORIDA. Auk 75(1): 96-98. Jan. 1958.

"To summarize: a group of 24 nest sites visited in 1935 has been revisited at intervals of about five years since then to determine the percent of these 24 nest sites which is occupied. The percent of occupied nest sites for the years on which visits were made is: 1935, 83; 1940, 46; 1946, 54; 1951, 67; 1956, 33 (or possibly as high as 50)."

Jumber, Joseph F. A STUDY OF THE HABITS OF THE EUROPEAN STARLING (STURNUS VULGARIS VULGARIS) IN CENTRE COUNTY, PENNSYLVANIA. M. S. thesis, Pa. State U. 1954.--P. F. English.

Kessel, Brina. (U. Alaska, College.) A STUDY OF THE BREEDING BIOLOGY OF THE EUROPEAN STARLING (STURNUS VULGARIS L.) IN NORTH AMERICA. Am. Midl. Nat. 58(2): 257-331, 19 figs. Oct. 1957.

Long important paper. Sections deal with: behavior during winter, return to nesting area, nesting sites and territories, selection of nest site, pair formation, courtship and mating, nest-building, factors affecting date of egg-laying, numbers and weights of eggs, intervals of egg-laying, clutch size in successive years, avian nest parasitism, incubation, hatching and brooding, nest sanitation, desertion, number of young, growth and development, weights of nestlings, sex ratios of nestlings, departure from nest, nesting success, second broods, breeding by first-year birds, molts, sex composition of population, survival and mortality, calculations of productivity. Females have higher mortality rate and are outnumbered by ♂♂ among adults. Mortality in first year of life is about 60%. Adult mortality rate is about 50% a year, but a few birds may live 5-6 years. About 20% of young fledged survive to breed.

Mayhew, Wilbur W. (U. Calif., Riverside.) THE BIOLOGY OF THE CLIFF SWALLOW IN CALIFORNIA. Condor 60(1): 7-37, 10 figs. Jan.-Feb. 1958.

Long paper based on 8-year study in which 18,004 birds were banded. Topics include: trapping methods, sex identification, use of artificial nests, habitat, factors affecting arrival dates, pair formation, vagrancy, homing, egg-laying, incubation, brooding, mortality of eggs and young, number of broods, returns of banded birds, nesting of yearlings, longevity, mortality, and recovery from injuries.

Oeming, A. F. (8448 136th St., Sub. P. O. 23, Edmonton, Alberta.) GOSHAWK TRAPPING IN ALBERTA. Blue Jay 16(1): 8-10, 3 photos. Mar. 1958.

The author has trapped 54 goshawks, 1952-57. He strongly prefers the Swedish trap (illustrated) for taking large predatory birds unharmed and recommends its use for control work at game farms. He also tells where to set these traps for best results in the wild. Weights and sex and age ratios are tabulated for the 54 birds caught. Sex ratio was 1 : 1. Ratio of immatures to matures was 2 : 1. Av. weights were: mature ♂♂, 1 lb. 14.5 oz.; mature ♀♀, 2 lbs. 9.3 oz.; immature ♂♂, 1 lb. 14.3 oz.; immature ♀♀, 2 lbs. 8.3 oz.

OTHER BIRDS--Continued

Quay, Thomas L. (N. C. State Coll., Raleigh.) THE SAVANNAH SPARROW (PASSERCULUS SANDWICHENSIS GMELIN) IN WINTER IN THE LOWER PIEDMONT OF NORTH CAROLINA. J. Elisha Mitchell Sci. Soc. 73(2): 378-388. Nov. 1957.

Subspecies present, populations, habitat preferences, foods, social behavior, daily activity cycle, response to abnormal weather, niche relationships. Fields of crabgrass (Digitaria) had highest populations, 10-15 per acre. Digitaria seeds were 70% of food. Three weeks of snow and ice resulted in lower populations and temporary change in feeding habits.

Robinson, T. S. (W. Mich. Coll., Kalamazoo.) NOTES ON THE DEVELOPMENT OF A BROOD OF MISSISSIPPI KITES IN BARBER COUNTY, KANSAS. Trans. Kans. Acad. Sci. 60: 174-180. 1957. [From Auk 74(4).]

"Location of nest, incubation, care of nest, growth of young, and food are described."

Stein, Robert Carrington. THE BEHAVIORAL, ECOLOGICAL AND MORPHOLOGICAL CHARACTERISTICS OF TWO POPULATIONS OF THE ALDER FLYCATCHER, EMPIDONAX TRAILLII (AUDUBON) Ph.D. thesis, Cornell U. 104 p. 1957. [From long abstract in Dissertation Abstracts 17(11).]

Two populations near Ithaca, N. Y., had distinct song-types and in physical measurements compared well with series of Empidonax traillii traillii and E. t. campestris. Individuals of each responded to playbacks of records of their own song and not to the song of the other type. The two types occupied slightly different habitats. Nest construction also differed. The author concludes that the two song-types act as good species in the Ithaca area, but does not raise them to specific rank because of the local nature of the study.

Townsend, F. Clark. (Brunswick, Maine.) BANDING BIRDS OF PREY IN MAINE. Maine Field-Nat. 13(1/2): 8-13, 1 photo. Jan.-Apr. 1957.

Includes information on foods of bald eagle, goshawk, broad-wing hawk, and barred owl in Me.

REPTILES AND AMPHIBIANS

Anderson, Paul. (604 W. College, Independence, Mo.) A SECOND LIST OF NEW HERPETOLOGICAL RECORDS FOR MISSOURI. Nat. Hist. Misc. no. 161. 1-5 p. Dec. 1957.

First reliable records for Mo. of 1 salamander, 3 turtles, and 2 snakes.

Bannikov, A. G. AGE COMPOSITION OF A POPULATION AND ITS DYNAMICS IN BOMBINA BOMBINA L. Doklady Akad. Nauk USSR 70(1): 101-103. 1950. Translation by A. Starrett, 4 p., 1 fig., mimeo., available on request from F. B. Turner, Wayne State U., Detroit, Mich.

European fire toads in and near a series of artificial ponds were collected, measured and released in May, July, Aug., and Sept. of 1947 and May and June of 1948. Two age groups could be distinguished in the spring: immatures hatched the previous year and adults of various ages. By July, the first group had grown 5-6 mm. and by Aug. had grown 4-5 mm. more, and was nearly of adult size. In Aug. the newly hatched formed a separate size group. In Sept. all older groups were in hibernation and only young of the year were collected. By May and June of next year, size groups had merged and showed same pattern as in previous year. Mortality from egg to metamorphosis was calculated to be about 46%; from metamorphosis to the following year, 98%. Overwinter mortality of yearlings was estimated to be 41%. Nearly complete population turnover was calculated to take place in 3.5 years.--L. F. Stickel.

Banta, Benjamin. (Nat. Hist. Mus., Stanford U., Calif.) A SIMPLE TRAP FOR COLLECTING DESERT REPTILES. Herpetologica 13(3): 174-176, 2 figs. Oct. 1957.

Cans, preferably 5-quart, are buried flush with ground and covered with corrugated cardboard that is propped up and held down by stones or the like. Some results are described.

Barbour, Roger W., and Rodney M. Hays. (U. Ky., Lexington.) THE GENUS DESMOGNATHUS IN KENTUCKY. I. DESMOGNATHUS FUSCUS WELTERI BARBOUR. Am. Midl. Nat. 58(2): 352-359, 2 figs. Oct. 1957.
Morphological variation, habitat, distribution in Ky., number of eggs, time of laying.

Bragg, Arthur N. (U. Okla., Norman.) SOME FACTORS IN THE FEEDING OF TOADS. Herpetologica 13(3): 189-191. Oct. 1957.
Reactions of toads of different sizes to size, movement, and type of prey.

Caldwell, David K., and Archie Carr. (Carr: U. Fla., Gainesville.) STATUS OF THE SEA TURTLE FISHERY IN FLORIDA. Trans. 22nd N. Am. Wildl. Conf. p. 457-462. 1957.
Of the 5 kinds of W. Atlantic sea turtles, only the ridley and the loggerhead are of commercial importance today. The green turtle, however, is by far the most valuable. It is imported at Tampa and Key West from Central Am. waters. Greens and ridleys are taken in Fla., mainly on the upper Gulf Coast. Since breeding colonies of these species are not found in Fla., it must be concluded that the populations there are migratory. Their origin is unknown. The problem of management, and the possibility that protection might allow resurgence of breeding populations in Fla., are discussed, and brief suggestions for a pilot farming undertaking are offered.--Archie Carr.

Carr, Archie, and Leonard Giovannoli. (U. Fla., Gainesville.) THE ECOLOGY AND MIGRATIONS OF SEA TURTLES, 2. RESULTS OF FIELD WORK IN COSTA RICA, 1955. Am. Mus. Novitates no. 1835. 1-32 p., 13 figs. June 1957.
Report of continuing studies on Chelonia mydas. Among topics discussed are: size and proportions of laying ??, returns of tagged animals, postocular counts, probability that separate schools of green turtles occur, sex ratios, probability that individual ?? lay more than once a season, superiority of fin tag over shell tag, details of egg laying, cues used to recognize nesting beaches, and mating.

Conant, Roger. (Zool. Soc. Phila., Phila. 4, Pa.) NOTES ON THE HERPETOLOGY OF THE DELMARVA PENINSULA. Copeia 1958(1): 50-52. Feb. 1958.
Comments on occurrence or distribution of 7 species of amphibians and reptiles. Corrects certain misunderstandings.

Diener, Richard A. (U. Oklahoma, Norman.) AN ECOLOGICAL STUDY OF THE PLAIN-BELLIED WATER SNAKE. Herpetologica 13(3): 203-211, 4 figs. Oct. 1957.
Interesting comparative study of N. erythrogaster and N. sipedon, with notes on N. rhombifera. Topics include: habitat preferences, seasonal activities, foods and feeding. The 2 spp. have different choices of foods and habitats and compete but little.

Fox, Wade. (La. State U. Sch. Med., New Orleans.) SEXUAL CYCLE OF THE MALE LIZARD, ANOLIS CAROLINENSIS. Copeia 1958(1): 22-29, 2 figs., 1 pl. Feb. 1958.
Detailed study of histological changes throughout season.

Fox, Wade, and Herbert C. Dessauer. (La. State U. Sch. Med., New Orleans.) PHOTOPERIODIC STIMULATION OF APPETITE AND GROWTH IN THE MALE LIZARD, ANOLIS CAROLINENSIS. J. Exp. Zool. 134(3): 557-575, 6 figs. Apr. 1957.

Green, Norman Bayard. (Marshall Coll., Huntington, W. Va.) A STUDY OF THE LIFE HISTORY OF PSEUDACRIS BRACHYPHONA (COPE) IN WEST VIRGINIA WITH SPECIAL REFERENCE TO BEHAVIOR AND GROWTH OF MARKED INDIVIDUALS. Ph.D. thesis, Ohio State U. 170 p. 1952. [From long abstract in Dissertation Abstracts 17(12).]

Haubrich, Robert Rice. HIERARCHIAL BEHAVIOR IN THE SOUTH AFRICAN CLAWED FROG, XENOPUS LAEVIS DAUDIN. Ph.D. thesis, U. Fla. 49 p. 1957.
Experimental study of social and aggressive behavior and their consequences.

Hutton, Kenneth E., and Clarence J. Goodnight. (Tulane U., New Orleans.) VARIATIONS IN THE BLOOD CHEMISTRY OF TURTLES UNDER ACTIVE AND HIBERNATING CONDITIONS. Physiol. Zool. 30(3): 198-207. 1957. [From Biol. Abs. 32(2).]
Aspects of blood-chemistry were investigated in 2 species of turtles: the terrestrial common box turtle, Terrapene carolina carolina, and the aquatic red-eared turtle, Pseudemys scripta elegans, in order to correlate any differences

with differences in modes of life. The terrestrial turtle had significantly higher concentrations of non-protein N, uric acid, sulfate, magnesium and chloride than the aquatic form. Other groups of these animals studied while in hibernation showed increases in glucose, uric acid, sulfate, magnesium, Na, and P.--Authors.

Livezey, Robert L. (Sacramento State Coll., Calif.) PROCAINE HYDROCHLORIDE AS A KILLING AGENT FOR REPTILES AND AMPHIBIANS. Herpetologica 13(4): 280. Jan. 1958.
How to use to kill or anesthetize.

Neill, Wilfred T. (Ross Allen Rept. Inst., Silver Springs, Fla.) HOMING BY A SQUIRREL TREEFROG, HYLA SQUIRELLA LATREILLE. Herpetologica 13(3): 217-218. Oct. 1957.
An individual frequently used the same resting site.

Neill, Wilfred T. (Ross Allen Rept. Inst., Silver Springs, Fla.) NOTES ON METAMORPHIC AND BREEDING AGGREGATIONS OF THE EASTERN SPADEFOOT, SCAPHIOPUS HOLBROOKI (HARLAN). Herpetologica 13(3): 185-187. Oct. 1957.

Pearson, Paul G. (Rutgers U., New Brunswick, N. J.) FURTHER NOTES ON THE POPULATION ECOLOGY OF THE SPADEFOOT TOAD. Ecology 38(4): 580-586, 2 figs. Oct. 1957.
Maintenance of home ranges, survival and disappearance, population density, and growth in S. holbrooki.

Ray, Carleton. (N. Y. Aquarium, Brooklyn 24, N. Y.) VITAL LIMITS AND RATES OF DESICCATION IN SALAMANDERS. Ecology 39(1): 75-83, 4 figs. Jan. 1958.

Saint Girons, H. (Lab. d'Évolution des êtres Organisés, 105 Blvd. Raspail, Paris 6, France.) LE CYCLE SEXUEL CHEZ VIPERA ASPIS (L.) DANS L'OUEST DE LA FRANCE. Bul. Biol. France et Belg. (Paris), Tome 91, 3e Trimestre, Fasc. 3: 284-350, 3 pl., 30 figs. 1957.
In French. Detailed study of sexual cycle of both sexes in the wild. Gross and microscopic anatomy and behavior are considered. Comparisons are made with other serpents and long bibliography is provided. The study is of special interest because the species is near the n. limit of its range in the area of study. In consequence, ♀♀ reproduce not annually, as further s., but every 2 or 3 years. Reproductive biology of this shift is described. Males maintain annual cycles, and these too are described. Author believes that both environmental temperature and intrinsic factors are involved in control of the cycles.

Shannon, Frederick A. (Box 276, Wickenburg, Ariz.) COMMENTS ON THE TREATMENT OF REPTILE POISONING. p. 405-412, in VENOMS, ed. by E. E. Buckley & Nandor Porges, Am. Assn. Adv. Sci., Wash. 5, D. C. 1956.
Recommends use of loose tourniquet, judicious incision, suction, and other medical measures. Futility of making deep incision at site of bite is pointed out; there is no "pool" of venom to be opened. Need of caution in use of antivenin is stressed--this material can do more harm than the bite. Serious warnings are given against use of the Ligature-Cryotherapy method: experience in use of this method has been bad, severe damage may result from the treatment alone, and medical knowledge of effect of cold is strongly against it.

Shannon, Frederick A. (Box 276, Wickenburg, Ariz.) FURTHER COMMENTS ON THE TREATMENT OF POISONOUS ANIMAL INJURIES. SW. Med. 38(2): 116-118. Feb. 1957.
Presents reasons for rejecting the Ligature-Cryotherapy method of treating bites of snakes and stings of scorpions, etc., and rebuts certain arguments made for this method. The L-C treatment is "an inadequately worked out method of demonstrable harm... The consequences have frequently proved to be disastrous."

Shannon, Frederick A. (Box 276, Wickenburg, Ariz.) TREATMENT OF ENVENOMIZATION BY ANIMALS IN ARIZONA. Ariz. Med. 14(3): 136-142. Mar. 1957.
Symptoms and treatments of reptile bites and arthropod bites and stings. For snake bite, Dr. Shannon recommends tourniquet just tight enough to stop lymph flow, careful use of suction, cautious use of the new and improved antivenin, transfusion if needed, and use of various drugs to reduce hemorrhage, pain, etc. 47 references are cited.

Smith, Philip W., and Sherman A. Minton, Jr. (Ill. Nat. Hist. Surv., Urbana.) A DISTRIBUTIONAL SUMMARY OF THE HERPETOFAUNA OF INDIANA AND ILLINOIS. Am. Midl. Nat. 58(2): 341-351, 13 maps. Oct. 1957.

Limits of species' ranges in Ind. and Ill. are mapped. Ecological and geographical affinities of the species are discussed. Conclusions are drawn as to probably geographic history of groups of species of similar distribution. Groups of eastern, western, southern, and northern species are recognized. Effects of post-glacial changes of ecology on distribution are pointed out.

Tinkle, D. W., and Wm. C. Lawrence. (Texas Tech. Coll., Lubbock.) BLOWGUNS FOR REPTILE SAMPLING. SW. Nat. 1(3): 133-134. July 1956.

How to collect lizards with blowgun of 3/4-inch aluminum tubing and darts made of corks and carpet needles. Considerable accuracy can be obtained at distances of 10-15 feet.

Volpe, E. Peter. (Newcomb Coll., Tulane U., New Orleans, La.) GENETIC ASPECTS OF ANURAN POPULATIONS. Am. Nat. 91(861): 355-371. Nov.-Dec. 1957.

Review paper with 4 p. of references. Summary: "Studies on polymorphism, quantitative characters, adaptive characters, population dynamics, and interspecific hybridization in frogs and toads have been reviewed and discussed. The fragmentary information on these aspects serves to emphasize the need for detailed, long range investigations on the genetic composition and structure of local populations (demes) of anuran species."

FISHES

Briggs, John C. (U. Fla.) A LIST OF FLORIDA FISHES AND THEIR DISTRIBUTION. Bul. Fla. State Mus. (Gainesville), Biol. Sci., 2(8): 221-318, 3 maps. Mar. 1958. $1.29, paper.

The bulk of this bulletin consists of a systematic list of species of both freshwater and marine fishes. Scientific names and common names (if any) are given, world distribution of each species is stated, and the general habitat (shore, benthic, etc.) of each species is indicated. Short introductory sections list habitat distribution of fishes by families; list Fla. species with circumtropical distribution; list Fla. endemics; discuss distribution of shore fishes; and discuss local distribution of shore, euryhaline, and freshwater fishes. Fourteen-page bibliography.

Circle, Homer, committee chairman. STANDARD CHECK LIST OF COMMON NAMES FOR PRINCIPAL AMERICAN SPORT FISHES. Outdoor Writers Assn. of Am., 7 St. Paul Street, Balt. 2, Md. 29 unnumbered p. 4th printing, revised and enlarged, 1958. Copies may be had by sending self-addressed, stamped envelope and request to publisher.

Latest edition of useful, pocket-size booklet. Gives both scientific and common names for fresh water and salt water fishes.

Hubbs, Clark. (U. Texas, Austin.) A CHECKLIST OF TEXAS FRESH-WATER FISHES. Texas Game & Fish Comm., IF Series no. 3. 11 p. 1957. [From Sport Fishery Abs. 2(4).]

Scott, W. B. (Roy. Ont. Mus.) A CHECKLIST OF THE FRESHWATER FISHES OF CANADA AND ALASKA. Roy. Ont. Mus., 100 Queen's Park, Toronto 5. 30 p., proc. Feb. 1958. 35¢, paper.

Note inclusion of Alaska--a natural and desirable action. This paper is a list of accepted scientific and common names of species. It indicates provinces and territories in which each species occurs. Subspecies are listed by name only. Taxonomic notes are given where occurrence or nomenclature is in question, or where Scott does not follow recent proposals. Forty-three references are cited.

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